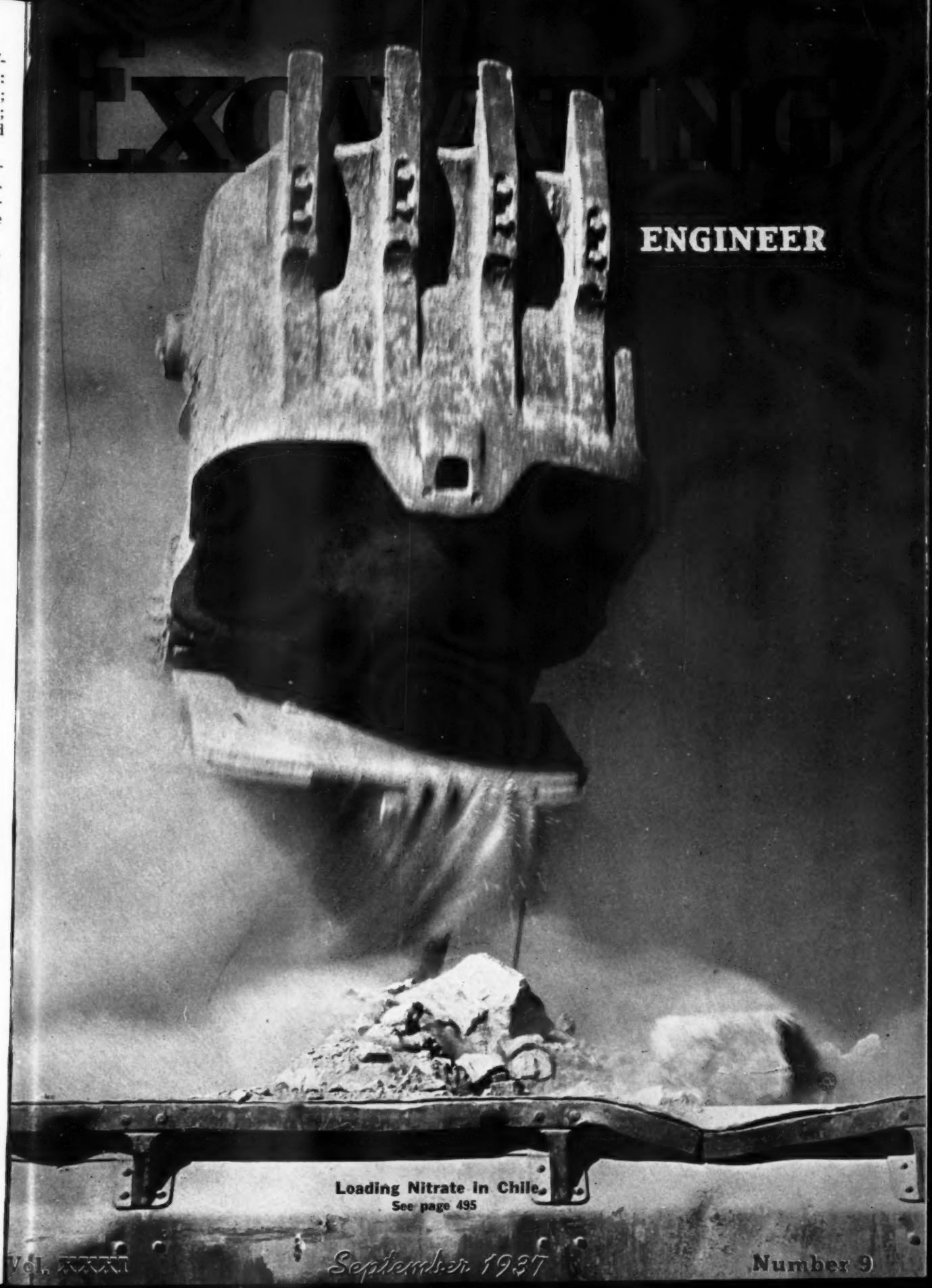
# EXCAVATING ENGINEER



Loading Nitrate in Chile

See page 495

Vol. XXXI September 1937 Number 9

# DAY and NIGHT

# CLETRACS

*give a great account of themselves...*

# ALL WAYS

THREE seven hour shifts—six days a week—week after week . . . that's performance which proves the stamina and power of Cletrac.

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Vol. XXXI September, 1937 No. 9

**Loading Nitrate** . . . . . **Front Cover**

*This photograph shows a Bucyrus-Erie 100-B loading nitrate on the Chilean Pampa. The picture, which has won numerous prizes in photographic competitions, is published through the courtesy of Alberto Mota P., Antofagasta, Chile.*

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### Diesel Tractor Lubrication

A lubricating engineer presents a thorough discussion of the problems and objectives in lubrication of that sturdy jack-of-all-trades, the Diesel Tractor.

### Great Lakes to Gulf

At White Horse Crossing, near Peoria, the Great Lakes Dredge and Dock Company is putting in a modern lock which, with a dam to be constructed later, is an important part of navigation improvements along the Illinois River.

### New England Highway

C. J. Maney puts new highway across salt marsh, through earth and rock cut and over two concrete-steel bridges. Efficiency in handling varied problems is chief feature of success on this tough job.

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# KEEP IT CLEAN!

***Bell Clay Company Takes Precautions All Along the Line to Insure Cleanliness of High-Grade Ball Clays Mined With Three Gasoline-Powered Shovels***

**By RICHARD BELL**
*General Manager*

BEFORE the war, ceramic manufacturers imported most of their high-grade clays from England and Germany. Today, however, ball clays from western Tennessee and western Kentucky have largely replaced the imported product. This shift has greatly stimulated modernization in the method used in mining the ball clays. As most clay deposits are now worked by the open pit method, the following description of operations at the Bell Clay Company mine, near Gleason, Tennessee, may be taken as representative of general procedure in the industry.

The Bell Clay Company was founded by Fred S. Bell and began prospecting for clay in Weakley County, Tennessee, in June 1928. The first property tested proved to have marketable clay on it, and was the nucleus around which the present large holdings of the company were expanded. The first shipment of clay from the Weakley County properties went forward from Gleason on September 5, 1928. From that beginning, the company has expanded until present equipment and storage facilities give an annual capacity of 40,000 tons.

### Geology

Clays are products of the decomposition of feldspathic rocks, and consist chiefly of hydrous aluminum silicates with varying amounts of other minerals and some organic matter. Clays must be classified according to their geological occurrence as residual and sedimentary (transported by water, redeposited and altered in the process). Ball clays fall in the latter class and are, generally speaking, clean and uniform. One of the chief problems in mining and marketing these clays is the development of a method which will insure against contamination at every point as the clay moves from bank to customer.

The presence of foreign substances such as sand, wood particles, soil, or rust will affect the fired strength, plasticity, absorption, and fired color of the clay. Impurities will also speck and mar the finished product. Hence, if these high-grade clays are to be marketable, they must be kept clean. Some of the finished products made with ball clay are shown in an accompanying illustration.

The principle ceramic manufacturing centers are at East Liver-

**This general view shows operating method at the big Bell Clay Co. mine. The ⅝-yard Bucyrus-Erie 19-B is stripping a 12-foot bench. (Note necessary dumping reach.) Below, right, the ⅞-yard 1035 is casting lignite back against the bank in final stripping. At left, the ½-yard 1020 is loading clay to 1½-yard trucks. The three men in the center are "peeling" sides and top of clay bank.**

• Top: Some finished ceramic products made from ball clay. This high grade clay has largely replaced the imported product in domestic manufacturing. Bottom: The 19-B is shown here operating on an 8-foot lift. Author Richard Bell is standing by the machine.

pool, Ohio and surrounding towns, such as Chester and Newell, West Virginia; Minerva, Scio, and East Palestine, Ohio. Other centers are the Zanesville, Ohio district, including such towns as Crooksville and Roseville; and the Trenton New Jersey district. Plants have also been established in numerous other cities in Tennessee, Indiana, Michigan, and California, where geographical conditions offer advantages.

At the Bell Company's Gleason mine, the clay stratum varies in thickness from three or four feet to five or six. Above this is two to three feet of lignite which is overlaid, in turn, by 50 to 60 feet of sandy overburden. This overburden is not blasted, as use of dynamite would shatter the clay deposit, causing cracks along and through which impurities would percolate.

### Stripping

Stripping, handled in three or four benches, as shown in one of the accompanying illustrations, is done by a new Bucyrus-Erie 19-B, equipped with a ⅝ yard dipper and by a Bucyrus-Erie 1035, swinging a ⅞-yard dipper; with a Bucyrus-Erie 1020, ½-yard shovel working in a clean-up position.

These rigs load to a fleet of 1½-ton Chevrolet trucks, carrying an average load of about three short tons. Average round trip haul is 800 feet, with the overburden being dumped on spoil piles by the trucks. No attempt is made at backfilling, as deposited waste would inevitably wash onto the clay deposits, contaminating them to some extent.

These three Bucyrus-Erie machines operate continuously the year around with the 1020 and the 19-B also handling the mining or loading while the 1035 remains on the stripping work.

After the stripping work for the ensuing year has been laid out the 1035 is placed in operation on a shallow cut clearing the way for the 19-B and the 1020, with the latter two machines operating on lower benches. In some instances, the 19-B and the 1035 work in tandem, that is load to the same fleet of trucks, with the 19-B leading the way and loading two dipper loads to the truck while the 1035 loads another heaping dipper to the truck as they pass on their way to the spoil piles. In this manner a smaller fleet of trucks can handle both rigs and these two rigs, thus working in tandem, have moved as much as 2000 yards per ten hour shift.

### Output

The 1035 operated by Finis Trantham and with J. D. White as greaser averages 900 yards per 10 hour day over a year's operation. While the 19-B operated by Loys Vaughn and J. D. White as greaser has moved as much as 1500 yards per 10 hour shift. Since beginning operations, the 19-B has averaged 1100 yards per 10 hour shift. The 1020 with Clete Hathcock operating and Roy Edmonston as greaser is used regularly on the mining and stripping work and also handles all clean-up jobs with a high degree of efficiency.

All maintenance work on both the shovels and the haulage equipment is handled competently by the mechanic, Thomas Brundige. A complete stock of repair parts is kept on hand and all repair work is handled on the job. Also, all equipment is inspected weekly, and thus serious breakdowns

are avoided by catching trouble before it can get a start.

All three of the shovels handle an average of 40 tons of clay per hour each, this figure being determined by the capacity of the shed loading equipment, and not by the capacity of the shovels.

To obviate the necessity of uncovering large areas of clay in advance of mining, and thereby risk contamination, the clay is mined in long, narrow blocks, averaging 100 by 25 feet. Advance stripping leaves a protective blanket of about eight feet of overburden on the clay until immediately before loading. This blanket is stripped, and the layer of lignite cast back against the overburden bank. As shown in an accompanying illustration, this step is being handled by the 1035. The purpose of casting the lignite in this way is twofold. First, it permits rapid handling so the clay block will not remain unprotected for long. Second, the lignite is an excellent filter and effectively prevents the sandy banks from washing down onto the clay. Any stream of water working down from the bank will be filtered of all suspended matter, and thus will not damage the clay.

Following the 1035, a crew with long-handled shovels "skins" top and sides of the clay block, removing any remaining particles of sand, lignite or soil.

### "Peeling"

In the picture mentioned above, the 1020 is loading right behind the skinning crew. This machine "peels" the clay—that is, loads it in "slices" eight or ten inches thick, peeled the full height of the clay block. This method of loading prevents chunking and provides thorough mixture of the clay in the stratum, or in the strata if more than one is being mined. Only a single stratum at a time is loaded at this Bell Clay

**• At right are regular records kept on the three shovels by the Bell Clay Company. During the month here illustrated, the 19-B and 1035 each worked 220 hours; the 1020, 100 hours. It is interesting to note that the new ⅜-yard machine moved as much dirt as the older ⅞-yard one, and at slightly less than half the cost.**

## BELL CLAY COMPANY

TRUCK NO. 19-B Shovel----Loya Vaughn, operator

MONTH OF MAY 1937

| | | | |
|---|---|---|---|
| 19-B Shovel moved approximately 25,000 yards during month | | | |
| Grease | | 4 | 00 |
| Oil | 31 quarts | 6 | 05 |
| Gasoline | 710 gallons | 127 | 80 |
| TOTAL FOR LABOR | | | |
| TOTAL FOR PARTS | | 2 | 70 |
| GAS, OIL AND GREASE | | 137 | 85 |
| ACCESSORIES | | | |
| TOTAL AMOUNT | | 140 | 55 |

MATERIAL USED

| QUAN. | DESCRIPTION | PRICE | |
|---|---|---|---|
| 1 | Trip cable | 2 | 70 |
| | TOTAL | 2 | 70 |

## BELL CLAY COMPANY

TRUCK NO. 1035 Shovel----Finis Trantham, operator

MONTH OF MAY 1937

| | | | |
|---|---|---|---|
| Labor on placing saddle shims | | 3 | 20 |
| Labor on cutting shims | | 1 | 00 |
| Labor on saddle blocks, shims, screwing down on frame | | 3 | 50 |
| 1035 Shovel moved approximately 23,000 yards during month | | | |
| Grease | | 16 | 50 |
| Oil | 22 quarts | 4 | 29 |
| Gasoline | 1205 gallons | 216 | 90 |
| TOTAL FOR LABOR | | 7 | 70 |
| TOTAL FOR PARTS | | 39 | 24 |
| GAS, OIL AND GREASE | | 237 | 69 |
| ACCESSORIES | | | |
| TOTAL AMOUNT | | 284 | 63 |

MATERIAL USED

| QUAN. | DESCRIPTION | PRICE | |
|---|---|---|---|
| 3' | Water hose | | 72 |
| 4 | Washers | 3 | 00 |
| 1 | Oil filter cart'dg | | 93 |
| 5 | Rack bolts | 3 | 00 |
| 1 | Hoist cable | 31 | 59 |
| | TOTAL | 39 | 24 |

## BELL CLAY COMPANY

TRUCK NO. 1020 Shovel----Clate Hathcock, operator

MONTH OF MAY 1937

| | | | |
|---|---|---|---|
| Labor on sprung hoist drum driver | | 42 | 95 |
| Labor on welding latch pin, swing clutch, and hoist brake hand | | 16 | 50 |
| 1020 Shovel employed cleaning off building site; also moved 13 miles to new operating location, under own power | | | |
| Grease | | 2 | 50 |
| Oil | 14 quarts | 2 | 73 |
| Gasoline | 172 gallons | 30 | 96 |
| TOTAL FOR LABOR | | 59 | 45 |
| TOTAL FOR PARTS | | 2 | 05 |
| GAS, OIL AND GREASE | | 36 | 19 |
| ACCESSORIES | | | |
| TOTAL AMOUNT | | 97 | 69 |

MATERIAL USED

| QUAN. | DESCRIPTION | PRICE | |
|---|---|---|---|
| 1 | Clutch pin | 1 | 50 |
| | Washers, keys, etc. | | 55 |
| | TOTAL | 2 | 05 |

Company mine, as a power shovel operated in this fashion assures a homogeneous mixture of the clay, as well as the highest degree of cleanliness.

With purity of clay at such a premium, drainage conditions are extremely important. If proper drainage were not possible, a clean, uniform clay would not be secured. This Bell mine is fortunately situated so that excavation of "natural" drainage ditches is possible. For further protection, Briggs pumps are available for emergency duty.

The truck haulage system is used because of the high degree of flexibility it offers. Also, the high-grade ball clays should not be subjected to any method of hauling that will allow them to be covered with dust, cinders, woody particles, or other foreign substances. The truck fleet used in hauling is equipped with all-steel, rust-proof, dust-proof bodies, designed and manufactured by the Anthony Company of Streator, Illinois. Since hauling is over dirt roads, the clay is further protected by placing large canvas tarpaulins over the truck beds. Average round trip haul from clay bank to storage sheds is four miles.

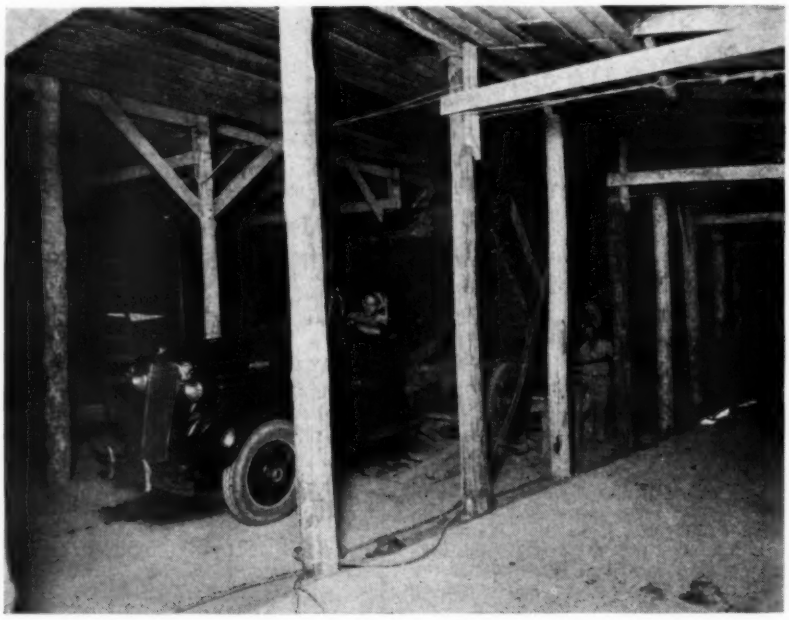
• **Trucks bring clay from mine to one of the 8 storage sheds. Clay is dumped into a hopper which feeds a belt conveyor. Trucks do not come within 30 feet of stored clay and hence cannot contaminate it.**

• **Waste is handled at spoil piles removed from the mining site and built up by trucks. No backfilling is attempted, and waste is moved to eliminate any possibility of material washing back on the clay. The Chevrolet trucks have 2-yard hydraulic dump bodies.**

### Storage

The urgent necessity for providing a pure product is the factor requiring storage capacity that will make it unnecessary to mine during the winter months or other inclement weather periods. If mined under unfavorable conditions, the clay has an excessive moisture content. It is also subject to contamination from sand and dirt sticking to equipment—and even to the shoes of the men. The average length of mining season is five to six months, but demand for the clay is uniform throughout the year. Hence the necessity for adequate storage capacity.

Operations are not confined to the mining season, as all three shovels are used for stripping in the off season. Ten hours a day,



six days a week, twelve months of the year, the shovels are working.

The modern storage sheds at this mine are equipped with concrete floors throughout, and are lined with a heavy, water-proof paper that is immune to fungus growth. A minimum amount of timber has been used in the construction, and all re-enforcing wires are of rust-proof double galvanized steel. Such a construction for the storage sheds provides maximum protection.

Trucks dump the clay into a hopper which feeds a belt conveyor. The conveyor takes the clay to a specially designed device which disintegrates, and shoots it up into the sheds. With this method in use, trucks never come within 30 feet of the stored clay, another of the many cleanliness-assuring features of this operation. All conveying equipment is wheel-mounted so that it may be moved and employed at any loading or storage point.

Usually clays are disintegrated before loading for final shipment. Very few lump shipments are made as disintegrated clays have distinct advantages for handling and subsequent processing at ceramic plants.

Special machinery has been designed for the disintegration of the highly plastic ball clays. This consists of a hopper equipped with baffles, at the bottom of which revolves a disk equipped with protruding knives. The weight of the clay maintains a pressure that keeps it in contact with the disk.

As the clay is cut up by the knives, it falls through ports in the disk discharging onto an 18-inch, inclined conveyor belt which in turn discharges the disintegrated clay onto a slow moving 36-inch conveyor belt.

One accompanying illustration shows the control board and a truck load of clay which is about to be discharged into the hopper at the bottom of which is situated the disintegrating mill.

Another illustration shows the inclined belt conveyor discharging onto the picking belt.

The disintegrated clay is automatically spread as it discharges onto the 36-inch picking belt where skilled pickers remove all foreign matter. The pickers work on both sides of the belt and a light trough concentrates the illumination directly on the belt and the material to be picked.

### Shipping

At the discharge end of the picking belt, a truck receives the thoroughly cleaned clay and transports it to the loading point. Here the truck dumps its load into a hopper, at the bottom of which operates a belt conveyor that carries it to the railroad cars. In the railroad cars, the conveyor discharges to a carloader which hurls the clay in place.

Before receiving the clay, however, the cars have been very thoroughly prepared. They are first cleaned and scraped by hand; rust spots being removed and papered over. Nails and tacks that might damage plant screens are removed, and any other necessary repairs made. The final cleaning is then given—a high pressure water system with a hydraulic head giving a 100-pound impact thoroughly scrubs and scours the entire inside of the car.

Finally, all bills of lading are stamped "Do not transfer enroute without consent of consignee." Thus, the long chain of precautions is capped by assurance that the work will not be spoiled through having the clay transferred to a dirty car.

• **The hopper shown in center takes clay from trucks, feeds it by gravity to a specially designed disintegrating mill. Practically all ball clay is shipped disintegrated to facilitate handling and processing at ceramic plants. Control board is shown at right.**

# Progress AND Profit

*By* JOHN R. MARCY

THE big dirt-moving jobs of recent years have brought with them new problems which have been solved in stride by the development of new methods and machinery. Progress in dirt moving has been so rapid it is difficult to realize just how far we've come in comparatively few years.

Imagine that it is 20 years ago, and you have just contracted a big construction job, a dam or a section of an aqueduct, for instance. Now look over the following list of equipment and see how much of it you will be using—remember, it is 20 years ago.

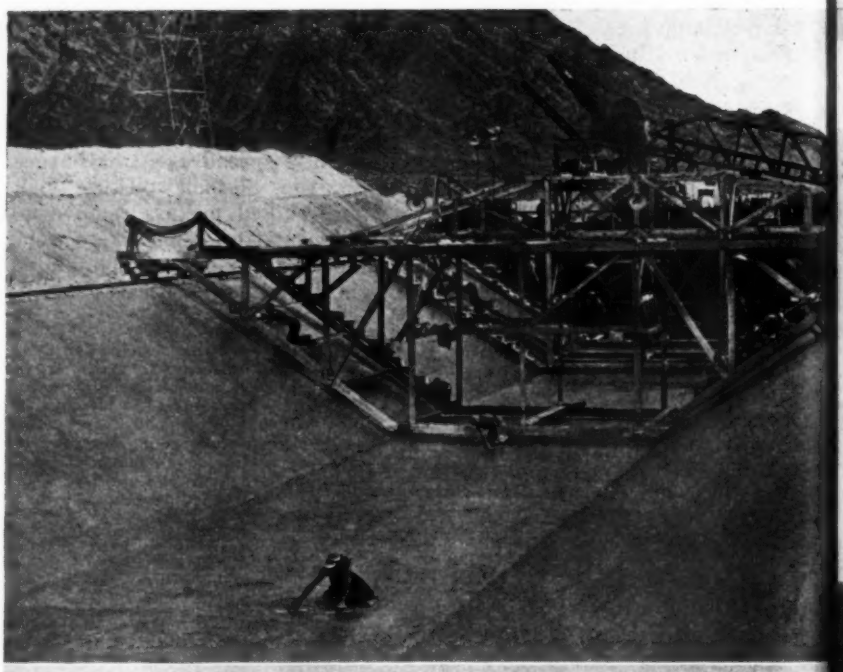
**Walking draglines, electric powered**
**Caterpillar mounted shovels, diesel**
**Caterpillar bulldozers and scrapers**
**Automatic drill batteries**
**Pumperete and Concrete guns**
**Electric tunnel cars**
**Mucking machines**
**Sheepsfoot tampers**
**Transit mixers**
**Canal trimmers**
**Pavement layer**
**Concrete bins**
**Automatic batching plants**
**10-yard trucks**

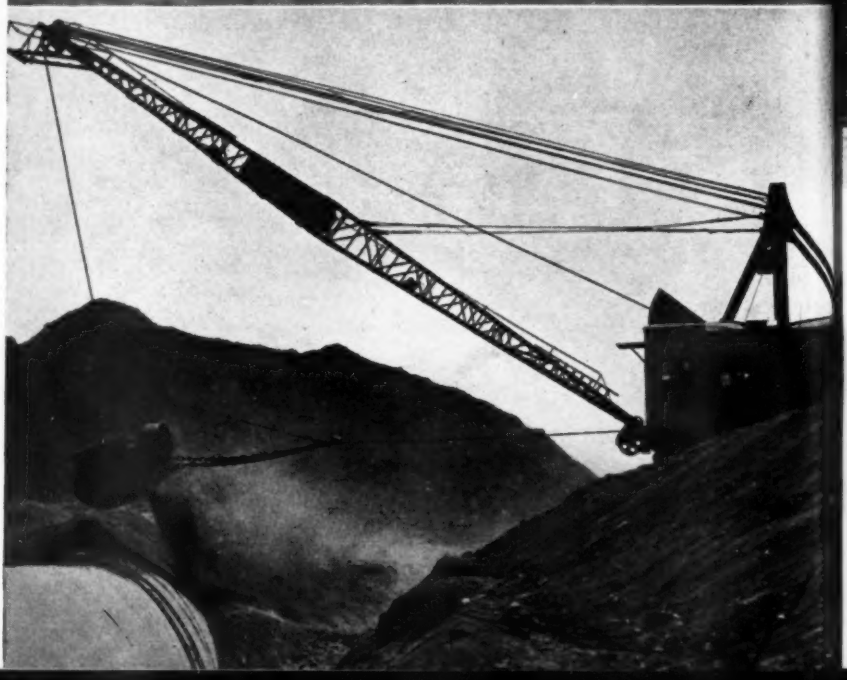
And while you're about it, you might figure out how long it will take to complete the job with the equipment you would have, and also how much you could have underbid your competitors had you had just a part of the items in the above list.

That list is, of course, only a partial one. There are dozens of other things which might be added, both large and small, which have been developed or perfected, within the last 20 years.

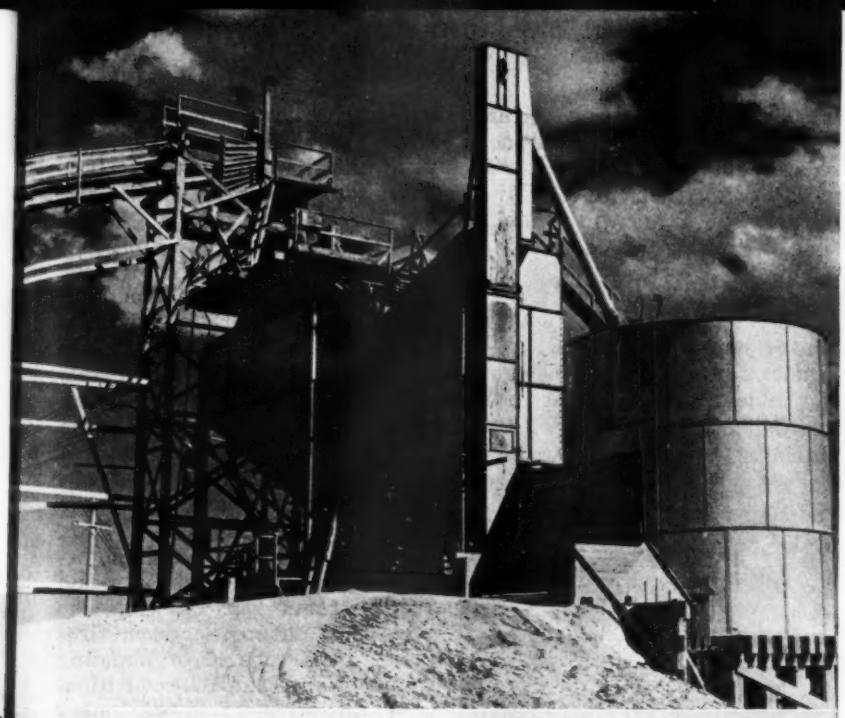
### Profit All Around

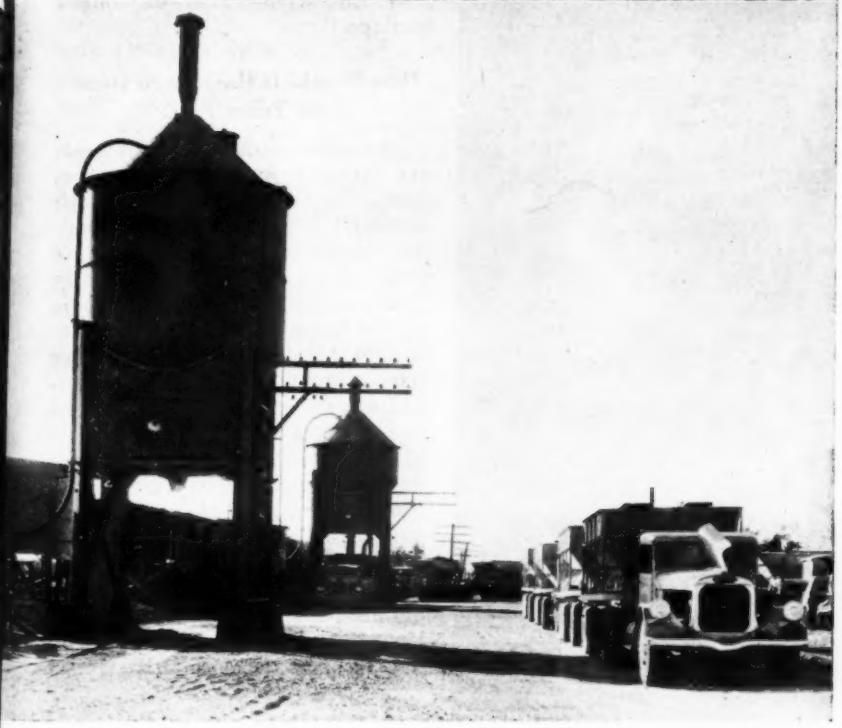
Modern equipment means economy of time and money, and those





• **Top: Special trimmers, developed by aqueduct contractors, smoothed dragline cuts, eliminating hand trimming. Facing jumbos, following trimmers, laid canal lining almost automatically. Bottom: Power, long booms and big buckets have speeded up dirt moving. Ability to work right on the edge of the bank also adds to efficiency.**





• **Top: 5,000,000 yards of concrete will be used in the aqueduct. Efficient, accurate, semi-automatic handling on a tremendous scale is possible only because of modern batching plants. Bottom: Big cement silos and special hauling equipment insure continuous flow of cement to batchers.**

two economies mean profit, not only to the one who takes a contract but also to the one who lets it.

The man who purchases equipment is primarily interested in lowering costs. If, for example, a contractor has obtained an excavating contract at 25c a yard, and finds that a certain piece of equipment will do the work 5c a yard cheaper than the figure he based his bid on, that 5c represents just so much added profit.

Such an example is that of the new canal trimmers used on the 63 miles of open canals on the Colorado River Aqueduct now under construction by the Metropolitan Water District of Southern California. To prevent waste of material it was essential that the bottom and sides of the canals be trimmed accurately to dimensions before the lining was placed. The canal surfaces to be trimmed amounted to nearly 500 acres, and the expense involved in finishing and trimming this by hand led to the development of special machines which proved most efficient. These machines were developed by the contractors on the job. They completely eliminated hand trimming.

Bids for this work were all submitted before the new equipment was developed, and were consequently figured on that basis. Now nobody but the contractors know just how much these machines cut down costs, but judged by economy of time alone it must have been considerable, for they rolled along at the rate of 30 feet an hour, a speed which, compared with that previously possible, was like running to walking. They did the work in just one-fifth the time that it could be done by hand.

### Flowing Concrete

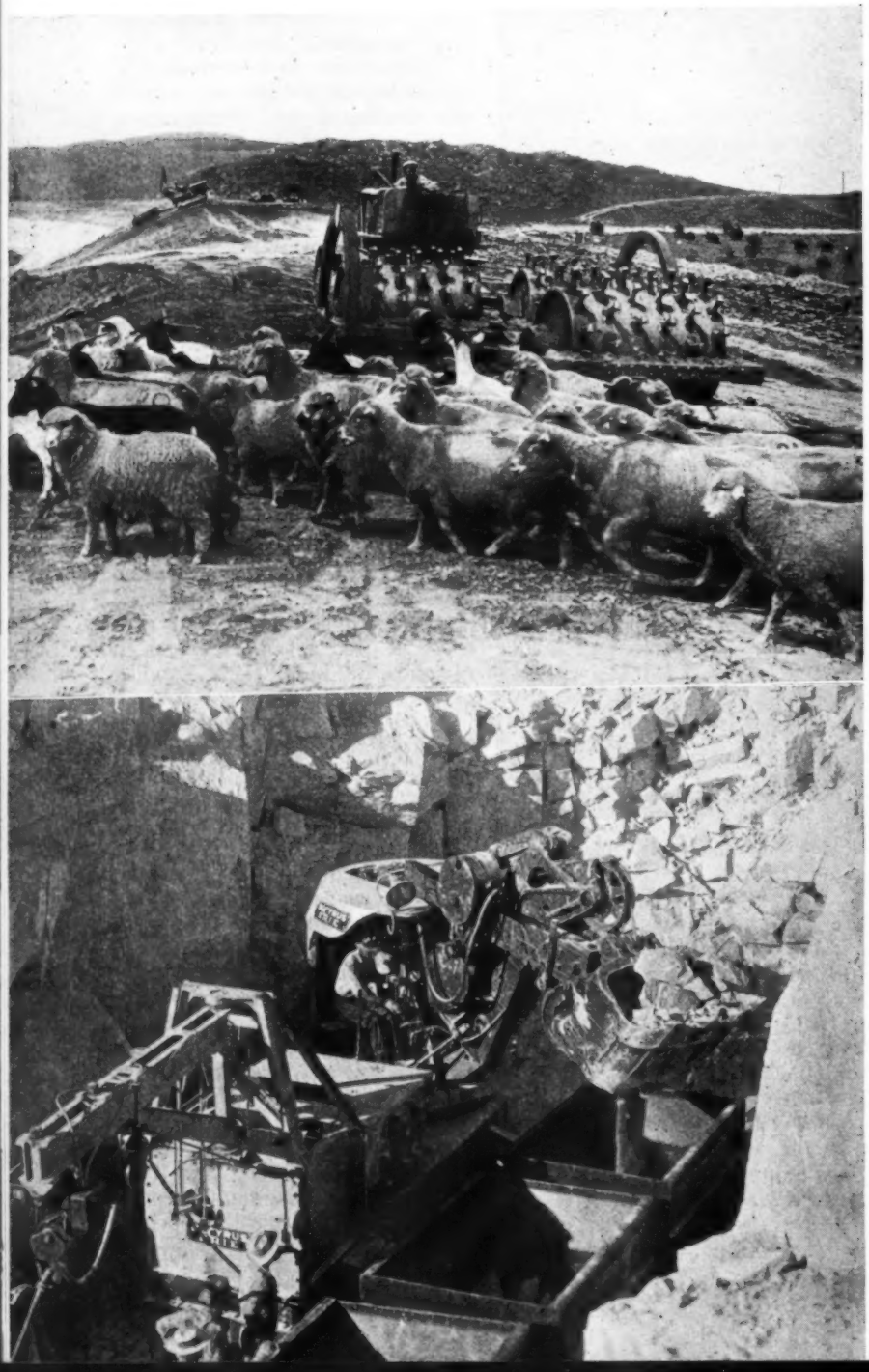
Then there is the job of concrete handling. On a project requiring 5 million cubic yards of this material, that in itself was no small task, and called for large scale methods. No sacked concrete is used at all. It comes in carloads, in bulk. It is handled more like liquid than solid, being made to "flow" from the cars into huge central storage silos, from where it again flows down into big trucks specially constructed for its transportation to the job. There again it is stored in big batching plants and is drawn off as needed and accurately batched by means of delicately calibrated scales. Usually it is conveyed to the job in transit mixers, a time-saving device unthought of a few years ago. The flowing principle does not stop even here, for in the tunnels it is carried on to the final placement through the use of Pumpcrete and concrete guns.

Dirt moving, too, has been vastly speeded up, chiefly through the increased capacity of buckets

and greater mobility of draglines and shovels. With the perfection of more efficient motors, stronger metals, and increased mechanical exactness, draglines and shovels of constantly increasing size have become practical, and take their giant mouthfuls as quickly and almost as cheaply as did smaller machines a relatively short time ago. Their mobility, in the light of comparison with the past, is astonishing. The little fellows scamper about like rabbits, perching dizzily on precarious brinks, while the big ones crawl more sedately but just as matter-of-factly, doing their work as they go, without a moment's loss of time.

### Saving $107 a Day

Indeed, dirt moving in all its phases has been speeded up by mechanical equipment. Contrast the mule-drawn plows, scrapers, and wagons of yesterday with the scarifiers, bulldozers, scrapers, and dump-trucks of today. A 1918 figure is illuminating on this point. At that time on a certain irrigation project in the west a big horse-drawn plow to loosen dirt for the ditches was costing $125 a day. A caterpillar tractor and scarifier was then introduced, and the same work was accomplished for $18 a day. While doubtless the reduction in operating costs and increased efficiency of 1937 equipment over the same type of equipment a decade ago would not be nearly so great, there is no question but that there would still be a considerable gain. Motors develop greater horsepower, machines are tougher and require fewer repairs, while the advent of pneumatic truck tires alone, tires capable of standing up under any load, has revolutionized the whole field of longer haulage.



### How Would It Have Been Done 20 Years Ago?

At Cajalco Reservoir, the western terminus of the main Aqueduct, the dam and dike, both earth-fill, require more than 8 million yards of dirt, and this is practically all being placed by trucks. The very fact that this will be completed in approximately two years from its beginning tells a story of modern mechanical efficiency. The 43 big trucks in use on the job have placed as high as 110,000 yards of earth during a seven day period here. Forming a mental picture of what moving 46 million yards of rock and dirt, the requirement of the entire Aqueduct, would be like by old methods, especially in point of time, brings a clearer realization of the progress that has been made in a few years.

At one end of Cajalco Reservoir grouting to a depth of 60 to 120 feet is necessary across the whole face of the dam to prevent seep-

• **Top: Here's a "before and after" picture! Earth fill dams used to be compacted by driving flocks of sheep over them. At Cajalco Reservoir, earth is placed in 6-inch layers, compacted with a fleet of tractor-drawn mechanical sheepsfoot tampers. Bottom: Improvement in mucking machinery and methods made possible increased speed and reduced costs achieved on the aqueduct.**

• **Top: Development of pneumatic tires has speeded up hauling, resulted in big 24-yard buggies, handled quickly and accurately by tractors. Bottom: Mounting five or more drills, modern carriages permit drilling the whole tunnel face at once.**

age. Hundreds of holes were drilled here down into the rock with new and powerful well drills. The use of this strong yet light and mobile equipment was a new step in the tough and tedious work of grouting, and the method proved highly efficient. These machines also proved the most practical for deep blasting, as was attested by their general use for this purpose along the Aqueduct.

Undoubtedly the most difficult part of the aqueduct product was the 118 miles of hard-rock tunnels, and in their construction particularly, many new developments, both in method and equipment have taken place. Automatic drills, a fairly recent innovation, have played an important role here, for because of the ruling that employees must be California residents, experienced drill operators were not available in sufficient numbers. Training men to use the automatic drill, though, was found to be quite easy, and modern equipment solved another problem. Drills in batteries, jumbos with collapsible wings, the California switch, and especially designed mucking machines which permitted the muck to be taken out without removing the jumbo—these and other factors reduced the time element in tunnel construction by one half, and cut the cost exactly in two. The detailed story of this revolutionary accomplishment has been given in a previous article in Excavating Engineer, and need not be restated here. That it was another triumph for modern equipment is the unanimous verdict of the engineers.

### Saving Time and Money

Because of the wide variety of types of work and conditions which make up the rest of the Aqueduct project, a definite figure such as that available for tunnel economy, cannot be accurately given. To say that all costs had been reduced 50 per cent, as can be said for the tunnels, would be mere guesswork. In some phases there would probably be little or no reduction; but it is quite certain that in many others—it is safe to say in most of the important ones—there have been appreciable reductions in actual monetary costs, and enormous savings in time.

On a project with the gigantic size of this one it is possible to utilize methods and equipment that would not be practical to the same degree on smaller works, and this needs to be taken into account in any estimate of economy. In general, however, the same methods and equipment used here can be made effective on any fair sized job, and the corollary of modern equipment and economy will be equally applicable.

# COVERING LAKE COUNTY

***Frank Kennedy finds mobility of 3/8-yard shovel-dragline-trailer unit enables him to handle jobs quickly throughout entire northern Illinois county***

FRANK KENNEDY of Libertyville, Illinois, is finding that there are plenty of medium- and small-sized jobs in his part of the state these days. He is able to take advantage of the various opportunities with a minimum of equipment investment because of his speedy, mobile equipment.

In April of this year, Mr. Kennedy bought a Bucyrus-Erie 10-B with shovel and dragline front end equipment, and a trailer for the machine. Operating as a shovel, this 10-B has a 13-foot, 6-inch boom, 11-foot dipper stick, and 3/8-yard cast front dipper. As a dragline, the Buda-engined rig swings a 3/8-yard Red Arch bucket on a 28-foot boom, which can be lengthened by a 5-foot extension unit.

The first job for the new machine was loading out gravel at Frank Kennedy's pit near Libertyville. This plant produces good bank run gravel which is sold principally for highway aggregates in the surrounding region. Facilities are available at the pit for washing, although this treatment is not ordinarily necessary.

Gravel loading is done on order, and not constantly, so it is not a full-time job for the new 10-B. To fill in the rig's "spare moments," Mr. Kennedy uses it on a series of jobs. One of the first of these was the construction of a private lake on Allendale Farm near Libertyville. Owned by W. D. Allen, of Brinks Express fame, Allendale is a 680-acre, modern farm raising prize livestock and fowl as well as crops.

Covering about an acre and a half, the lake will range from one to six feet in depth, a gradation fixed on to make it available as a swimming pool. Bottom and sides will be lined with a blanket of about 1,800 yards of washed pea gravel to prevent roiling, and sides will be sloped 2 to 1. Water for the lake will be piped in from a flowing well one of three on the farm. Also, 26-inch drainage tile in the adjacent territory will provide some water. A spillway at the lower, or east, end of the lake will carry water out, as continuous flow is necessary to keep the body of the lake fresh.

The first step in excavating the lake was taking off the top soil. This was accomplished with a special Austin-Western 2-wheeled blade scraper drawn by a Caterpillar tractor. Top soil was saved to spread in a five-inch layer over the terraced fill which will be made around the lake.

With the top soil removed, the 10-B was moved in, equipped as a dragline, to excavate about 7,000 yards of heavy clay from the lake site. This yardage is smaller than might seem necessary because the lake is located in a slight natural valley. The 10-B was loading the clay to two 4-yard, hydraulic-dump trucks, one International and one Chevrolet, when we visited the job early in July.

Trucks carried the clay on a short haul to the fill area. Because of the shortness of the haul, the two trucks could be handled to avoid delaying the dragline. Smoothing and compacting the filled terrace was to be handled by a bulldozer-equipped Caterpillar tractor, which would later spread the rich black top soil. Later, evergreens are to be planted on the terrace.

Heavy rains which tended to fill up the excavation area and make the heavy clay slippery provided the chief digging problem on this job. However, water was pumped out and the work went on. The record day as far as dragline output was concerned, at the time the job was visited was 640 yards, truck measurement. This figure was recorded handling clay, in one 8½-hour shift, during which the 10-B used 19 gallons of gasoline.

The 10-B did not work steadily on this lake job from the time it was moved in. One two-day "vacation" was taken. The front end equipment was changed to shovel, the machine loaded on its trailer and moved to the town of Volo, about 15 miles away. Here, the 10-B dug a 465-yard basement and a 300-yard septic tank, both for a country club, in two days.

This mobility is, perhaps what has impressed Superintendent J. J. Kennedy most about his brother's new 10-B. He said, "It's just right for our business as we have to move around a lot. It handles nice on the trailer, loads in about 10 minutes, and average 25 miles an hour on the road easily. It's under the state weight limit, so we don't have to worry about special permits. So far, we've averaged about 2¼ hours for changing front ends, but we expect to cut that down with practice. Gas consumption runs from 1½ to 1¾ gallons per hour in heavy work, and we haven't had any trouble with the rig."

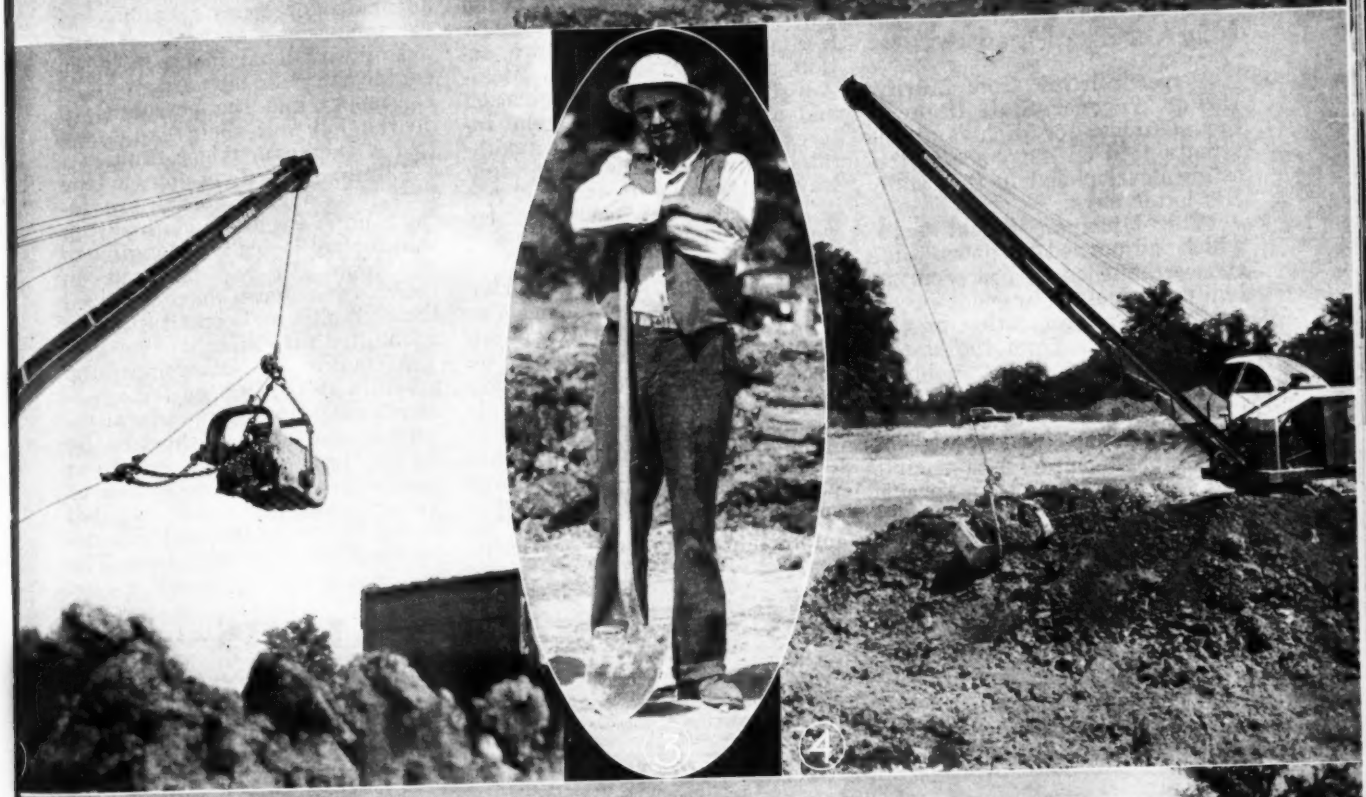
Bill McHenry, long time operator for Mr. Kennedy, likes the speed of the new rig. After watching the way he used that speed, swinging the bucket out, bringing it flat into the clay and coming up with a heaping load as nice as you please, we don't wonder.

The lake is not the only work for the 10-B at Allendale. The other job is building a "farm-service road," about three-quarters of a mile long, running from the main buildings on the east to the west limits of the farm. From 800 to 900 yards of excavation will be necessary on this road which will be graded, shouldered, and surfaced with gravel.

On completion of the Allendale job, Frank Kennedy has more

*(Continued on page 546)*

**1. Excavating the western end of acre-and-a-half lake. The Allendale house can be seen in the background. 2. A heaping 3/8-yard dipper in route to the truck. 3. J. J. Kennedy is superintendent for his brother Frank. 4. 640 yards truck measure, is record day for this job. 5. Material in foreground will be bulldozed into a terrace to be covered with topsoil in background.**



# EXCAVATING ENGINEER

*A Monthly Publication*

**Devoted to the Excavating Industry**

The Excavating Engineer Publishing Co.
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D. B. REED, JR.
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## Highway Precedent

A recent letter from Murray D. Van Wagoner, State Highway Commissioner for Michigan, calls attention to an extremely interesting development in that state. His letter says:

"The Michigan legislature, which adjourned a short time ago, established a precedent in highway finance by enacting a continuing appropriation of $5,000,000 a year from the state's general fund to the Michigan State Highway Department.

"I believe that this is the first instance in the United States of the establishment of the principle that revenues other than specific motor vehicle taxes should be allocated for highway purposes. Here for the first time an appropriation from the general fund has been made supplementing motor vehicle revenue. In this instance, the revenue is obtained from the state's 3 per cent sales tax.

"Hence, in Michigan there is not only no diversion of highway revenues for other than highway purposes, but also the use of revenues from general taxation for these purposes."

Mr. Wagoner felt, and rightly, that this assuring of $5,000,000 annually, in addition to regular highway revenues, would be of interest to highway authorities throughout the country. Coming at the peak of an ever-increasing diversion, and at a time when anti-diversion sentiment is finally beginning to crystalize into action, this signal victory in Michigan should be both an inspiration and a challenge to everyone interested in securing and maintaining a modern, adequate highway system in this country.

There are still those who say we have enough highways, and that we should turn our attention —as well as the motorist's money —to more pressing problems. The tragic untruth of this contention should become obvious to anyone not solely interested in securing highway funds for some pet project upon looking at our recent national accident records. A yearly, and increasing, automotive death toll of 38,000. A yearly record of 1,000,000 injured in automobile accidents. A yearly entering on the national balance sheet of nearly $2,000,000,000 economic loss from automobile accidents.

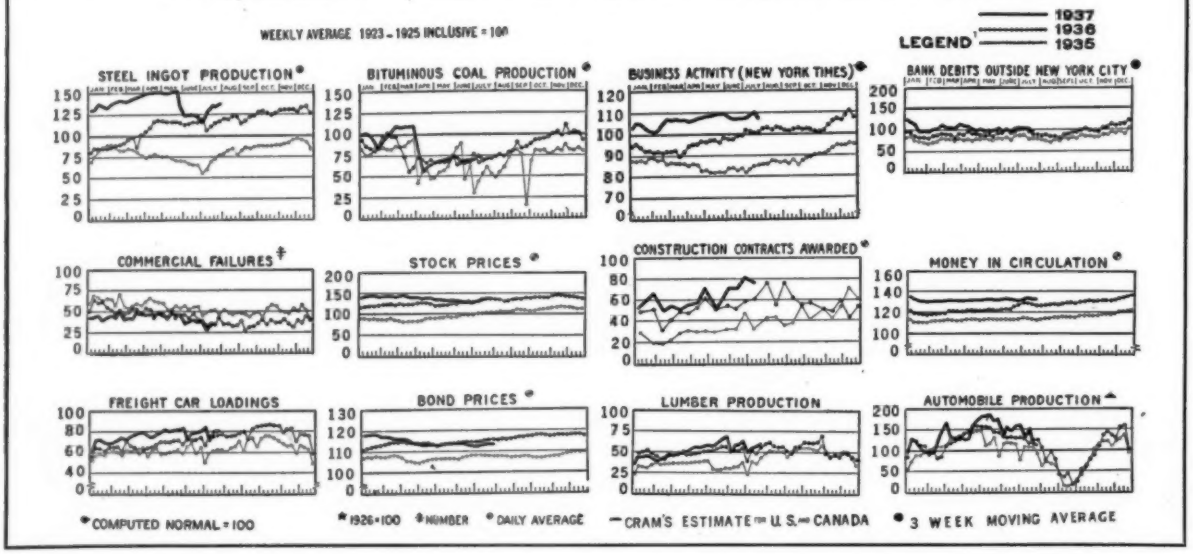
These staggering figures must be charged mainly to roads inadequate for the traffic that uses them. Highway studies have shown that our accident total can be reduced only slightly by driver education and police activity, admirable as these are. The only practical answer is an adequate highway system. And the problem is not static. The number of passenger cars and trucks on our roads is constantly increasing and will continue to increase. This means we have the job of making our highways not only adequate for today's traffic, but for tomorrow's as well.

Highway departments have the engineering k n o w l e d g e, the equipment and the personnel to do the job, but their hands are tied if they cannot get funds.

Eliminating diversion is the first, most obvious step in providing these funds, and insuring that money logically belonging to our highways will be used on them. Five states have realized the necessity, and constitutionally prohibited diversion.

A major anti-diversion step taken in 1937 has been the application of penalties to several diverting states, as authorized by the Hayden-Cartwright Act. In at least one case, this deduction of Federal Aid funds has resulted in restitution to the highway department of diverted funds. The

## WEEKLY BUSINESS INDICATORS



prospect of penalties will undoubtedly be a real check to future diversion.

The three favorable developments just mentioned should be regarded as merely a starter, as a proof that results can be achieved. There is still a tremendous job to do in showing state legislatures the need and justification for guaranteeing adequate highway funds.

All credit to Michigan for pioneering in a much-needed direction!

### *New High In Construction*

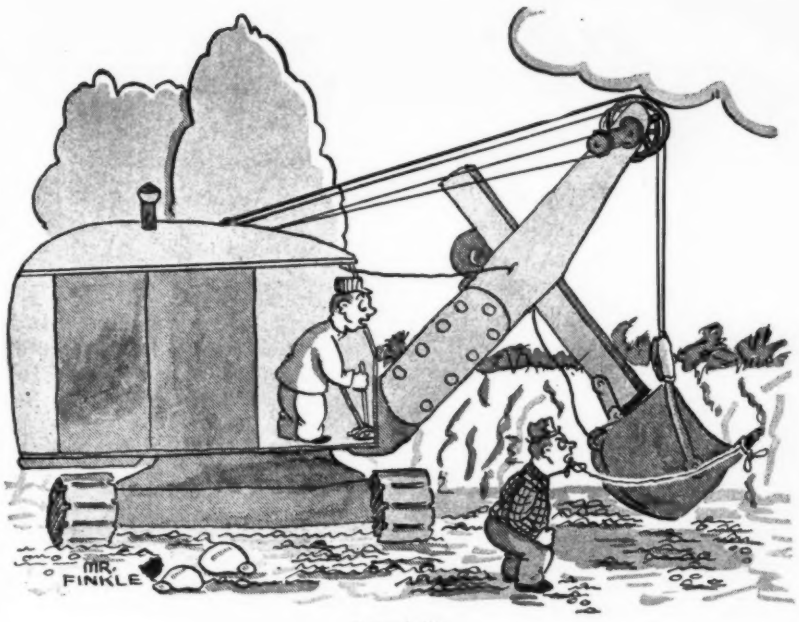
CONSTRUCTION recovery reached a new high point in June, topping the previous recovery peak reported in July, 1936 by eight per cent. According to figures of F. W. Dodge Corporation, the June construction total covering all classes of work amounted to $318,137,100 in the 37 states east of the Rocky Mountains. This was an increase of 30 per cent over the figure of $244,112,800 for May of this year and represented a gain of about 37 per cent over the June, 1936 total of $232,664,700.

Of the June, 1937 total, residential building accounted for $93,123,100; non-residential building took $125,087,000; while the remaining $99,927,000 went into civil engineering projects, i.e., public works and utilities.

The June residential figure compares with $83,937,000 for May and with $73,604,600 for June, 1936. Increases in residential building as contrasted with totals for a year earlier were well distributed geographically with every important major area sharing in the advance except metropolitan New York and the St. Louis territory.

Increases in June over a year ago in non-residential building operations occurred in every major geographic district, excepting only the Southern peninsula of Michigan, the New Orleans territory (Louisiana and Mississippi) and Texas.

Civil engineering projects showed increases over June, 1936 figures in every district except upstate New York, the Southeast (The Carolinas, Georgia, Florida, Alabama and Eastern Tennessee) and the St. Louis territory.




*"Ready?"*

### *Can You Help?*

We have been asked to assist in the location of shovel engineer Charley McClullan. According to information furnished us, he worked as late as two years ago in the vicinity of Denver, Colorado, and was later reported to be in Australia.

If Mr. McClullan happens to see this, we would be pleased to have him write us, or if any reader knows of his present whereabouts, please drop us a line.

### *Penalty*

A reduction of $250,000 in the $1,676,718 of Federal-aid road funds available to the State of New Jersey for the year ending July 1, 1937 has been made because of the diversion of Motor vehicle revenues from highway purposes, according to a recent bulletin of the Department of Agriculture.

The certificate announcing the reduction filed with the New Jersey Highway Department and the U. S. Secretary of the Treasury states that the penalty is required by the Hayden-Cartwright Act where any state diverts gas taxes and other vehicle revenue in greater amount than was provided by law on the date of passage of the act. The penalty, it is stated, shall not exceed one-third of the Federal-aid fund available in any year.

New Jersey, the first state to be so penalized, we hope will be the last.

## D. W. Hurey

With the passing on June 29 of David W. Hurey, the excavating industry lost one of its colorful old-timers. Born at Stockton, California, August 14, 1880, Mr. Hurey was left an orphan at the age of four. When he was 18, he began working on dredges on the Sacramento River, working up to the position of skipper.

In 1908 he went to work for the U. S. Government in the Panama Canal Zone. For 10 years he was employed in a supervisory capacity in the Marine Division, earning the title of captain. In 1918 he left government service with a rating of EE (excellent in both character and efficiency) and returned to California where he was a superintendent for various contractors until 1926. At that time he went into the contracting game for himself at Martinez, California.

During the past nine years he lived in the Salinas Valley region, where he was engaged principally in drainage and reclamation work.

His death came suddenly as a result of a heart ailment contracted during an attack of tropic fever. He is survived by a brother, Robert W. Hurey, of Salinas.

# CALYX DRILLING

***Bureau of Reclamation Finds Large-Hole Core Drilling Successful in Inspecting Rock Formations at Project Sites***

***By* VOLLIE TRIPP**

"CALYX", or "shot" drills have been used in core drilling for some time, but important strides have recently been made in this method of boring rock. Up at Kennett and Friant dam sites, of the Central Valley Project, (Calif.) United States Bureau of Reclamation engineers have been obtaining cores the size of Greek columns, 36 inches in diameter, to be exact. The columns are not long enough to be of any use in building, but the method suggests possibilities.

Calyx drills are so-called because they operate with "calyxite", an extremely hard steel shot. Calyxite is obtained by atomizing iron or steel and suddenly chilling the particles of metal. The resulting "shot" average about 3 thirty-seconds of an inch in diameter, and rival boreum in point of hardness.

The chief differences between the shot drills used in small diameter holes and those used at Central Valley and other reclamation projects, is that in the latter the core-barrel is not used. The principle feature of these drills is a smooth steel cylinder, 36 inches in diameter and five-eighths of an inch in thickness, with a 1 inch thick cutting shoe and a fitting at the top of the cylinder for attachment to the drill rod. Narrow grooves cut in the side of the cutting shoe facilitate introduction of the calyx under the drill bit, and also afford an outlet for the water supplied through the hollow drill rod. The shot is admitted to the water which is pumped down the drill rod, the amount being regulated by a gate, or valve. Under the revolving pressure of the bit the shot shatters into tiny fragments, each fragment presenting a razor sharp edge to the face of the cut. Water flushes away the muck and those particles of shot which have become so finely pulverized as to be no longer useful. Naturally the bit is also rapidly worn away, but at a much slower rate than the rock. To offset this objection the later drills were equipped with a removable bit, or shoe, which could be replaced at no great expense. This feature has proved quite satisfactory.

**Wedges Used for Core Breaking**

To remove the cores the shot bit and rod must be pulled out of the hole, as it would be impossible to break off the core, or hoist such weight with any sort of drill barrel. Two methods are used to break off the core. In some formations a small charge of dynamite is set off in the cut. Where it is desired to leave the hole as clean and undisturbed as possible the core is broken off by two or more wedges driven against the sides of the column. Wedges are generally preferred to dynamite, as the latter is likely to shatter the sides of the hole to some extent. The principle reason for employing this type of drill is that it permits a geologist or engineer to inspect the formation undisturbed and *in place*. Where explosive is used some means must be found for removing the fumes from the hole when an inspection is desired, and this is an additional reason for using wedges.

Two methods are used to get hold of the core, after it has been broken loose from its base. In hard rock a small hole is usually drilled in the center of the core, and an anchor bolt with eye inserted therein. Where formation is too soft to use the anchor bolt device, or in rock likely to separate at seams, a sling consisting of two loops of small cable strand has overcome the problem. The loops are dropped around the core and bind against each other in such fashion that a lifting pressure results in a correspondingly great horizontal pressure. By the use of the sling it is possible to lift cores intact with numerous seams which would have separated, dropping part of the core back into the hole, had the anchor bolt device been used. In ground

• **Ingersoll-Rand calyx drilling outfit set up and ready to put down a 36-inch hole permitting examination of formation in place.**

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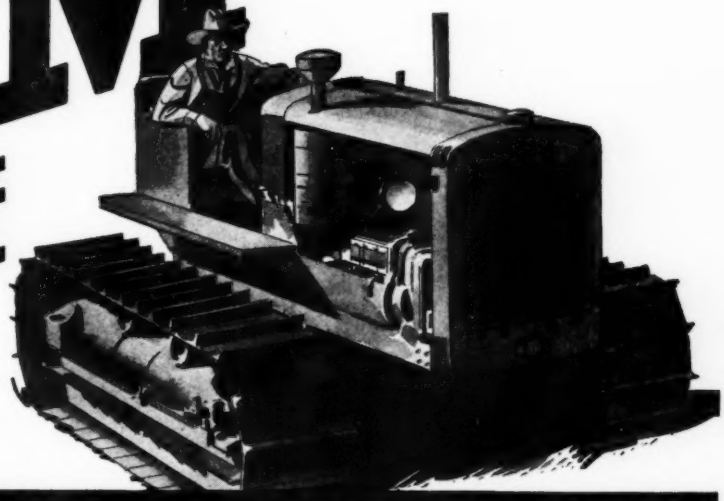
There is only one Diesel Engine Lubricating Oil identified by the "RPM" trade-mark.



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An Alabama "Caterpillar" distributor writes: "Have watched 'RPM' Diesel Engine Lubricating Oil perform under every type of service, since in our territory 'Caterpillar' Diesels are employed in every conceivable type of work. 'RPM' Diesel Engine Lubricating Oil performance is outstanding."

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With its tough film of high oiliness, *specially compounded* "RPM" Diesel Engine Lubricating Oil keeps your Diesel engine lubricated. Keeps rings clean—free from carbon. Minimizes blow-by and power losses. Prevents sludge. Keeps oil channels open. Try "RPM" Diesel Engine Lubricating Oil. Learn why this *patented* product is the most widely used Diesel engine lubricating oil in the world.

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For your convenience in writing to Standard Oil Co. of California, you will find a card bound in this issue.

• Group of 36-inch cores brought up from calyx-drilled exploration holes.

too soft or friable to permit use of either anchor bolt or sling a large auger with scarifying teeth is used to clean out the cavity.

The drills operating at Columbia Basin Project, Washington, Central Valley Project, California, and the Colorado River project, Texas, have all been of 36 inch diameter. Ingersoll - Rand Type WS-3 is powered by a 35 h.p. throttle-governed gas engine. The Ingersoll-Rand Type WS-2 is electrically driven. Both types are similar in other respects.

### 1126-Foot Hole Put Down

It is interesting to note that a calyx drill, boring a five-foot hole, was developed by Mr. J. B. Newsom for use at the Idaho-Maryland mine, in Grass Valley, California. With Mr. Newsom's shaft boring machine a hole 1126 feet deep was made. This machine worked in the hole itself, and of course had to be hoisted out each time before the core could be removed. In general working principle it was similiar to the 36-inch drills. The designer expressed the belief that holes of 1200 foot depth were perfectly feasible. There is no reason to suppose that holes several times this depth could not be reached, in the opinion of this writer. The only depth limiting factor would appear to be water, and the heat which would be encountered. The greatest depth reached by the reclamation engineers with a 36-inch drill was 92 feet at the Marshall Ford dam site, (the Texas project). These drills were designed to bore a 50-foot hole. When the bit was sunk beyond this depth the drill rod whipped badly, resulting in much loss of power. By means of a guide bearing fixed to a beam which was wedged to the sides of the bore this trouble was eliminated.

### The Water Problem

The problem of water limits to a certain extent the inspection value of these borings. Where water entering the hole can be controlled by pumping, or grouting, or both, the geologist can descend the shaft and see exactly what kind of formation he has to deal with. Grouting may be accomplished through holes drilled in a circle around the shaft, or within the circumference of the proposed bore. Colored grout is recommended in order that it may not be confused with seams in the rock, or other natural strata.

In every case where water can

(Continued on page 546)

## Table I

Table I refers to 8 holes and 11 setups at Grand Coulee, Washington.

| | | |
|---|---|---|
| Total working time to date | hours | 2,866.75 |
| | man-hours | 7,215.48 |
| Total drilling time to date | hours | 1,167.76 |
| | man-hours | 2,454.49 |
| Percentage of working time used in drilling | per cent | 40.7 |
| Total delays—equipment failures and service | hours | 201.82 |
| | man-hours | 436.57 |
| Total time for moving drill and removing cores and rods | hours | 1,497.17 |
| | man-hours | 4,324.42 |
| Total shot used | pounds | 9,130.0 |
| Total depth drilled | feet | 385.69 |
| Shot used per foot of drilling | pounds | 23.7 |
| Drilling per hour in feet of | working time | 0.13 |
| | drilling time | 0.33 |
| Total cost of drilling | | $12,105.87 |
| Cost of drilling per foot | | $31.39 |

# GOES ALLIS-CHALMERS

**66**

**MORE A-C UNITS TO DIRT MOVERS AND LOGGERS**

**THREE WEEKS' SALES**

Now the Pacific Northwest joins the big parade . . . the big swing to BALANCED power. During three short weeks, Allis-Chalmers dealers in the Portland area alone reported orders for 66 units from industrial power users. No big fleets, no "special" business . . . just the usual run of orders from buyers who insist on getting more for their money. Many of these deliveries were to "repeat" owners, including a Model "L-O" Oil Tractor to L. Coluccio who was the first Model "L" owner in the Pacific Northwest.

Allis-Chalmers pioneered the BALANCED tractor . . . in which excess weight is reduced through proper balance between power, speed and weight. Instead of excess tractor weight you haul more payload. Your work "goes faster"—A-C tractors are designed to give maximum performance in the higher speeds, at which you do more than 90 per cent of your work. Pick-up is faster, hill-climbing is better, fuel is saved, operating costs are lower — and your investment is reduced. Tractor weight saved is extra payload GAINED. Ask for these interesting facts!

**MODEL "L-O" OIL TRACTORS**

**MODEL "LL-O" OIL TRACTOR LOGGERS**

**MODEL "LL" LOGGERS**

**MODEL "S-O" OIL TRACTORS**

**"K-O" and "WK-O" OIL TRACTORS**

**"K" and "WK" TRACTORS**

**MODEL "WM" TRACTORS**

**"WM's" WITH HOUGH LOADERS**

**MODEL "IU" WHEEL TRACTORS**

**MODEL 54 SPEED PATROLS**

**MODEL E-60 POWER UNITS**

**MODEL U-40 POWER UNITS**

**MODEL W-25 POWER UNITS**

**AT THE RIGHT TIME**

# EQUIPMENT
## *You Ought to Know About*

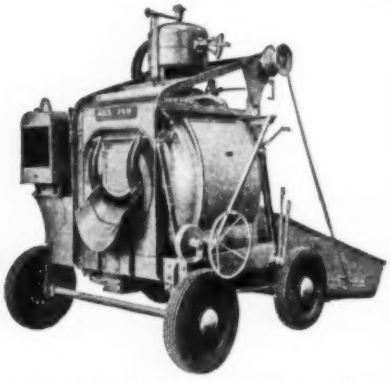
### *Piling Grip and Puller*

A new technique for pulling piles has recently been developed by Kellems Products, Inc., 1911 Park Ave., New York. It is an adaptation of the expansible and contractible principle of cable grips used for many years for pulling electrical cables through underground conduits. This principle is applied to the construction field and the steel grips will pull pilings from 14 to 18 inches in diameter.

### *Rex 14-S Mixer*

Chain Belt Company of Milwaukee announces a stream-lined 14-S Mixer.

Charging is made fast by the use of a Shimmy Skip which, together with the stream-lined shape of the Skip, discharges the

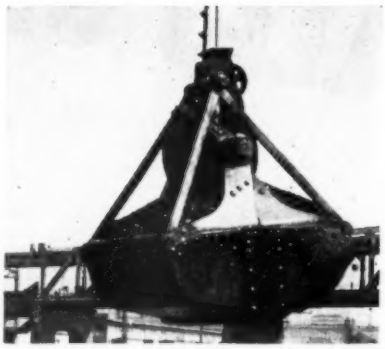


batch into the drum with a fast-sliding action. The drum with its "up-and-over" mixing action and oversize buckets has one piece construction with the pressed steel drum heads welded integral with the center sheet. Discharging through the extra large drum opening onto the stream-lined chute, the drum is completely cleaned in seven seconds.

### *Hayward Clamshell Bucket*

The Hayward Company, 50 Church Street, New York, has just issued a new grab bucket for coal, coke and similar bulk materials, known as Class E-15.

This new model clamshell is built to a weight of just about a pound of bucket to a pound of material carried. Modern, light-



weight alloy construction makes this increase in capacity possible, and at the same time gives increased strength.

### *First-Aid Kit for Treating Burns*

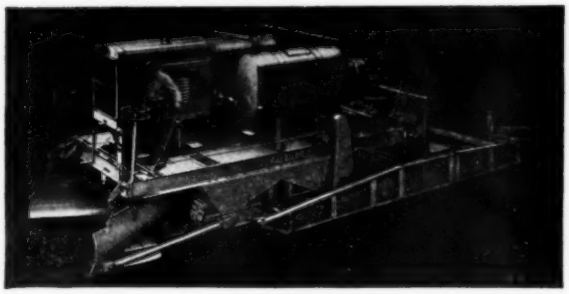
A first-aid kit, specifically designed for the emergency treatment of burns has been developed by the Davis Emergency Equipment Company, 55 Van Dam Street, New York, for use in all places where burns of a serious degree may occur.

The Davis Burn Kit contains 12 gauze compresses, which can be opened up in progressively larger sizes so that they can be used for covering small or large areas; 12 six-yard lengths of four-inch bandage for holding the dressings in place; 6 five-oz. tubes of Tannoid, the tannic acid treatment for burns; and three packages of wooden applicators for applying the Tannoid.

### *Jaeger Mix-in-Place Road Builder*

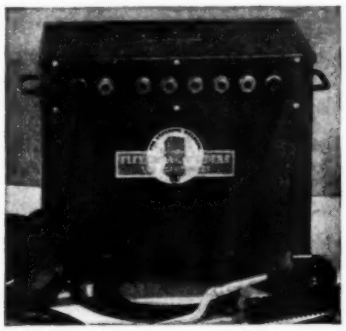
The Jaeger Machine Company, Columbus, Ohio, has developed a self-propelled Model MP-2 Road Builder for building heavy retreads and stabilized base up to 9 inches depth uncompacted by means of one pass mixing-in-place.

The machine is a combination of two units — a twin pugmill mixing unit, complete with gathering plows and screws, and storage tanks and pumps for applying binder while mixing, and a spreader-finisher unit, consisting of adjustable strike-off mounted on 21 ft. long floating-edge runners which equalize subgrade irregularities and lay out a finished surface ready for rolling. Heavy duty crawlers, driven by 130 H.P. engine and steered by individual clutches, propel the Road Builder at speeds consistent with the volume of material being mixed.



### *Westinghouse Welders*

To meet the increasing need for a low cost a-c. welder for use in maintenance and repair as well as light construction work, the Westinghouse Electric and Manufacturing Company have announced the Midget Marvel A-C Welder. This welder comprises a special transformer and control especially designed for alternating current arc welding. The new set, it is claimed, has unusually high operating efficiency averaging 87% at normal loads. The 60



cycle model complete with all accessories is listed at $123.50. The 50 cycle model is $134.50.

The welder is portable being equipped with handles and four large hard rubber swivel casters for moving to convenient locations. The 60 cycle set weighs 112 pounds and the 50 cycle set weighs 130 pounds.

# BUCYRUS-MONIGHAN

## CONQUERING THE DESERT!

This Walker has completed one cut on this section of the All-American Canal and is taking the next, as it works *from the one bank*. This machine can finish an additional width of 50% or more from the same side of the work because it can move forward or back away at right angles or at *any* angle to the excavation . . . Manufactured by Bucyrus-Monighan Co. — Chicago, Illinois.

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

# Field Notes

## *Splicing Shovel Cables*

In splicing a flexible cable it should always be remembered that the splice should be as flexible as the cable itself. The practices ordinarily followed in the splicing of regular power cables cannot be followed if satisfactory results are to be obtained.

1. Remove the outer rubber jacket sufficiently to permit the staggering of the splices on the individual conductors which will reduce the outside diameter of the cable and improves the electrical strength of the splice by not having the taped splice of each individual conductor opposite the other. The distance to be cut back depends on the conductor size of the cable, as the conductor increases in size the length of the connector is increased.

2. The tape or braid should be removed to a point approximately 2″ from the splice to prevent braid leakage.

3. The splicing of the conductor may be accomplished by one of two methods.

a. The strands of the two conductors should be opened slightly and then forced together so that the strands of one conductor interlace the strands of the other conductor for a distance of about ¾″. A small amount of solder may be used to make a good electrical contact. A special connector is then applied and squeezed into place.

b. A splice may be made without the use of connector in which case the insulation should be cut back as above, and the strands of both conductors opened up then closely wound together for a distance of ¾″. A drop of solder applied at each end to hold binding wire firmly in place should also be used in this splice.

4. Pencil off edges of the rubber insulation with a sharp knife running the pencil back approximately 1″. Dress off the pencilled edge and rough up the adjacent edge of the rubber insulation. It is suggested that the initial roughing be done with a clean metal file, care being taken not to nick the copper. Follow this with a cleaning of the pencilled edge with sandpaper. Do not use emery cloth since graphite dust is a conductor in itself and will result in a leakage path up through the various layers of the construction.

5. Coat the sleeve, copper and rubber with a thin coat of rubber cement and allow same to set for a period of at least three minutes.

6. Apply rubber insulating tape beginning at edge of pencilled end and building up layer for layer with the pencilled edge until a total thickness 1½ times the cable insulation has been obtained over the entire section of the exposed rubber covered conductor. Maintain a sufficient tension of the rubber tape during application to reduce its width to one quarter of its original width, thereby assuring an even well knit section. Tape to be applied with a half lap.

Note: It should be remembered that the final moisture seal and dielectric of the splice is provided by the rubber wall and it is exceedingly important that no folding or creasing of the rubber tape should take place. Remember that it is better to use too much rubber tape than not enough.

7. Cover the rubber wall with one layer of anhydrous tape applied with a short lay and a half lap.

8. Examine the splice at this point and if the insulation seems to be soft indicating porosity, this may be remedied by using the handle of a screw driver and the palm of one hand to roll out possible voids.

9. Where ground wires are included in the cable they should be spliced in the same fashion as the power conductors and carefully laid in the valleys ready for final finishing of the splice.

10. When the cable contains shielding braids over individual conductors or over the assembled conductors, the shielding braid or braids should be made continuous over the hand-applied insulation or assembly by a close wrap of metal foil and tinned copper tape or flat braided tinned copper strap soldered at both ends to the factory applied shielding braid.

11. The most satisfactory splice in an electric shovel cable can be made by the use of a portable vulcanizer which can be secured from several suppliers and instructions for their use are available. This type of splice is highly recommended.

12. If there is no vulcanizer available, additional rubber tape should be applied beginning at the center of the splice and working toward each end, building up to uniform thickness at least equal to the original molded jacket. This insulation should be finally covered with two layers of anhydrous tape applied with a ¼″ lap.

13. It is suggested that in finishing a splice which is not to be vulcanized in a portable vulcanizer that a damp cloth be wrapped over the rubber tape tightly and that it be heated to a point where steam passes off the cloth. This will partly vulcanize the rubber tape and improve the characteristics of the splice.

**Editor's Note: These splicing suggestions are taken from an excellent instruction book issued by the General Cable Corporation, 420 Lexington Ave., New York, N. Y.**

## *Inexpensive Handy Tri-Square*

Among the number of emergency repair tools kept about the machine, the small useful tri-square seems to head the list of those most frequently lost and misplaced. A fairly good one is an item of expense. A very satisfactory 'proxy' which one can loose without going into the 'red' is shown here. Fasten a light block or strip of wood to a common small corner brace to make it easy to grip and handle. The brace can of course be filed on the outer edge to fit an accurate small square in the shop. It affords a very serviceable little tool for the repair kit and is quite accurate enough for most emergency jobs.

# KOEHRING DUMPTOR

**KOEHRING DUMPTORS** are being used with great success for road pioneering and construction work in the vast northwest logging areas. Instantaneous front end dumping, with three speeds forward or reverse, qualifies the Dumptor for high speed dirt moving and placing in restricted operating space. Other time-saving features establish the Dumptors as highly economical and speedy dirt hauling units in the lumber production industry.

**KOEHRING COMPANY**

Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks

3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN



For your convenience in writing to Koehring Company, you will find a card bound in this issue.

# SHOTS *from the Firing Line*

## *San Gabriel No. 1 Completed*

Late in July, San Gabriel No. 1, the highest rock fill dam ever built, was completed. Built by the West Slope Construction Company for the Los Angeles County Flood Control District, the dam contains 10,572,000 yards of rock. It is 2,000 feet thick at the base, has a crest length of 1,670 feet and towers 355 feet above bed rock. Of bench type construction, the dam was built up at an average rate of 460,000 yards per month, with peak placement of 964,556 yards in May, 1937.

The original contract, signed in January, 1933, called for a dry rock fill dam to consist principally of large, hard rock.

However, when the quarry near the site was opened, it was discovered that there was not a sufficient quantity of suitable rock, and that much more material would have to be wasted than could be used.

Consequently, work was stopped, a new design prepared. In July, 1935, a supplementary agreement covering the new design was signed, and the West Slope forces turned on full steam.

The new design called for flattering slopes from 1½ to 1 to 3 to 1, and the dam was divided into zones to be built up of a core of quarry run material, mechanically compacted. A clay-sand zone was specified upstream from the core, and above this, a zone of quarry run material.

Downstream, quarry run material is graded from fine to porous.

## *Flood Control Program*

A well-balanced program of construction for the Lower Mississippi River under the provisions of the Overton Act has been prepared by the Corps of Army Engineers. Regularly appropriated funds have been allotted by the Chief of Engineers to the Mississippi River Commission and the U. S. Engineer Offices at Memphis, Vicksburg and New Orleans.

The program prepared thus far totals some $26,000,000. Details related to Relief Funds are being worked out with the Works Progress Administration. When these negotiations are completed, further work will be announced. The program already completed is as follows:

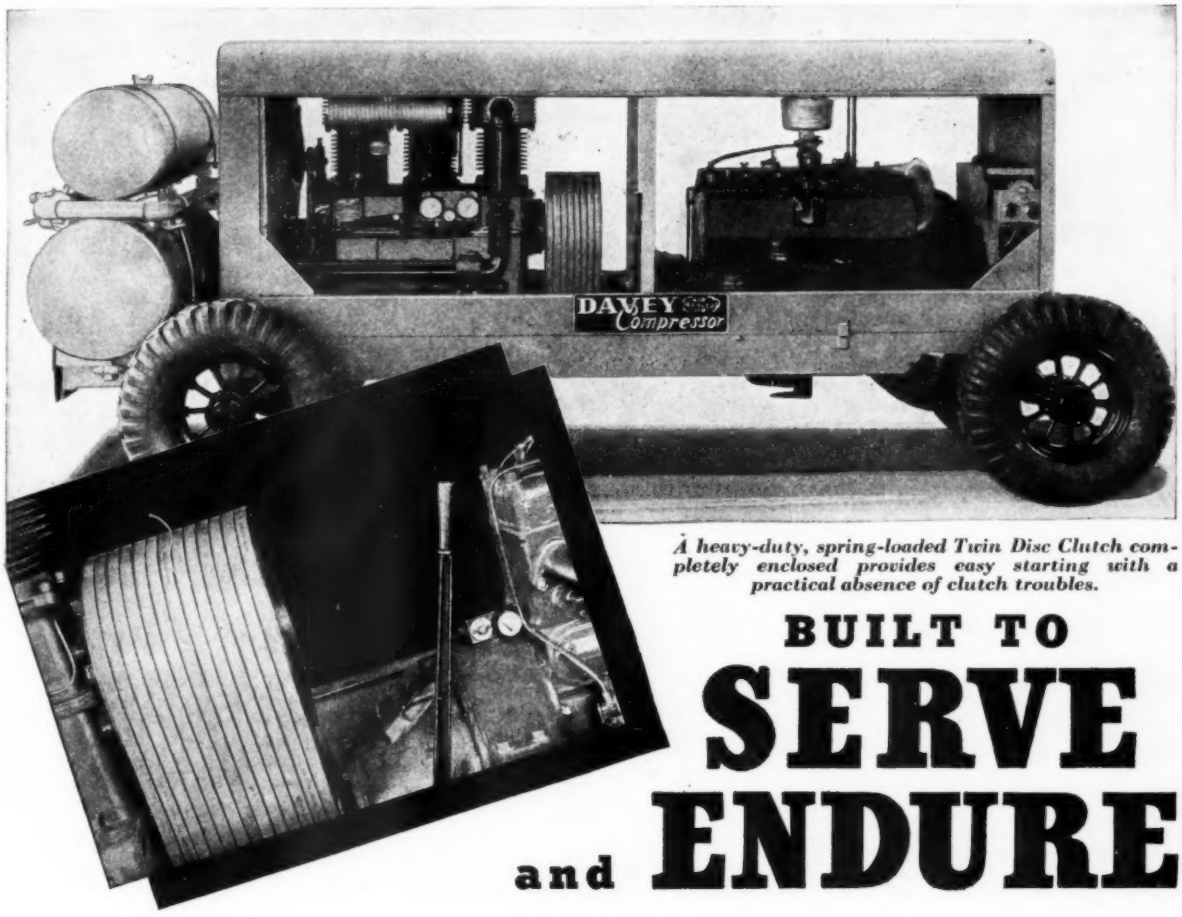
| | |
|---|---|
| Mississippi River main line levees | $ 4,600,000 |
| Channel stabilization and revetment | 1,620,000 |
| Contraction works | 150,000 |
| New Dredging | 4,850,000 |
| Maintenance Dredging | 1,210,000 |
| St. Francis River levees | 2,180,000 |
| White River emergency reservoir | 1,500,000 |
| Studies of Eudora Floodway | 150,000 |
| Sardis Reservoir | 3,100,000 |
| Berwick, La. outlet to the Gulf | 3,030,000 |
| Bridges in the Atchafalaya Basin | 750,000 |
| Flowage studies and miscellaneous items | 1,610,000 |
| Clearing Bonnet Carre Spillway | 150,000 |
| Roads on levees | 1,100,000 |
| | $26,000,000 |

This program is subject to minor modifications, dependent on compliance of local co-operation in providing rights-of-way, easements, etc., and to some extent on the availability of relief labor on certain items of work. To this extent the program is tentative, but instructions have been issued by the Office of the Chief of Engineers to place the program under way immediately.

## *Reclamation Appointments*

Three major appointments in the Bureau of Reclamation, including that

• **Morris G. Laramie puts in a sewer trench in Detroit with his new Bucyrus-Erie 19-B dragshovel. The trench is five feet deep, ten feet wide. Average daily gas consumption for the 19-B on this job is 30 gallons. Gordon Laramie is job foreman, Branton Brown is operator.**

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***Built to serve and endure!*** **That's the slogan of the makers of Davey Air-Cooled Compressors, who say, "Both of these qualities are found in Twin Disc Clutches; therefore they are an essential part of our compressor units.**

**"We also found that this clutch worked well with our multiple V-belt drive, in such a way as to enable both engine and compressor to operate at their best speed, resulting in a large fuel economy and low repair cost."**

**TWIN DISC CLUTCH COMPANY**

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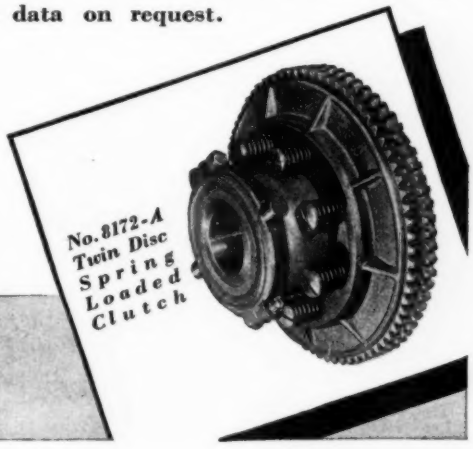


TWIN DISC CLUTCHES



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of Roy B. Williams as Assistant Commissioner, have been announced by Secretary of Interior Harold L. Ickes.

Mr. Williams, Construction Engineer of the All-American Canal and Gila Projects with headquarters at Yuma, Arizona, until his new appointment, will leave the west to take up his duties in Washington, John C. Page, Commissioner of Reclamation, said.

Other appointments included that of J. Kennard Cheadle as Chief Counsel and Assistant to the Commissioner, and Wesley R. Nelson as Chief of the Engineering Division in the Washington office of the Bureau.

The three positions thus filled have been vacant for some time. The promotion of Mr. Williams also resulted in personnel changes in the field which will send Leo J. Foster, Construction Engineer of the Truckee River Storage and Humboldt Projects from the Reno, Nevada office, to Yuma where he will succeed Mr. Williams as construction engineer of the All-American Canal and Gila Projects. Charles S. Hale, now at Reno, will become Acting Construction Engineer of Boca Dam of the Truckee River Storage Project and Stanley R. Marean, also at Reno, will become Acting Construction Engineer of the Humboldt Project.

• **On the Rosa Irrigation Canal at Yakima, Washington a "Caterpillar" Diesel Seventy-Five track-type tractor pulls this specially constructed ditch-shaping machine, of the type developed on the aqueduct. The tractor pulls the huge machine along in low gear and both the bottom and sides of the ditch are finished accurately and smoothly.**

## *$495,250 Cement Contract for Marshall Ford Dam Awarded*

Contracts for manufacture and delivery of 250,000 barrels of low heat Portland cement for use in construction of Marshall Ford Dam, near Austin, Texas, have been awarded to two Texas companies.

The Republic Portland Cement Company of San Antonio, Texas, the lowest of four competitive bidders whose proposals were opened June 21 at the Denver office of the Bureau of Reclamation, received a contract to supply 75,000 at a net cost to the Government of $1.96 per barrel and a total cost of $147,000. This company bid only on part of the cement for which offers were requested.

The Trinity Portland Cement Company of Dallas, Texas, received a contract for the remaining 175,000 at a net cost of $1.99 per barrel or a total of $348,250. This company was second low bidder.

"The fact that we obtained truly competitive bids on this cement is gratifying," Secretary Ickes said. "It was only a little more than a year ago that the Bureau of Reclamation called for bids on a similar quantity of cement for another dam on the Colorado River of Texas and received four identical proposals. The successful bids today, it might be noted, were lower than the identical bids received in 1936 despite the fact that a special cement is involved, the low heat variety."

The cement purchased under these contracts will be about one quarter of the total which will be required in completion of the first stage of Marshall Ford Dam, being constructed by the Bureau of Reclamation as a flood control and river regulation dam in the series of dams planned by the Lower Colorado River Authority of Texas to subjugate the dangerous Colorado River.

Marshall Ford Dam, first stage, will be 190 feet high and will have a crest length of 2,325 feet, including an earth embankment 30 feet high and 1,100 feet long at the left abutment. The first stage will create a reservoir of a capacity of 600,000 acre-feet.

• **Fast hauling is a characteristic of Harry Campbell's road job near Harrisburg, Pennsylvania. One of his Bucyrus-Erie 43-B's loads La-Plant-Choate rubber tired wagons pulled by Caterpillar Diesel RD8's.**

## *The Deepest Hole*

Bedrock was reached recently at Parker Dam site in the deepest hole ever dug for the foundation of a dam.

Six Companies, Inc., began excavation on this job last October, following successful diversion of the Colorado

*The "Caterpillar" Diesel doing this bulldozing job is lubricated with Sinclair Ten-ol.*

# for HEAVIEST WORK .. LEAST WEAR

## and 10 times more Diesel Service Hours

# SINCLAIR TEN-OL

Reg. U. S. Pat. Off.

**Wouldn't you like to keep your "Caterpillar" Diesel engine or tractor giving top-notch performance through many thousands of hours at lowest possible upkeep cost?**

**You can by using Ten-ol, the new, fused lubricant developed by Sinclair for "Caterpillar" Diesels.**

**Here's the proof. In laboratory tests with "Caterpillar" Diesel engines, more punishing than any service duty, and also in actual field operation, Ten-ol demonstrated that it gives ten times more service hours than the finest straight mineral oil.**

**In 2000-hour heavy-duty, high-output wear tests, "Caterpillar" Diesels, lubricated with Ten-ol showed less than 1/10 the cylinder liner wear shown by similar engines lubricated with the finest "straight" oil.**

**Order Sinclair Ten-ol, Sinclair Diesel fuel and other Sinclair products from your local Sinclair office, or write Sinclair Refining Company (Inc.), 630 Fifth Avenue, New York, N. Y.**

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**Sinclair TEN-OL is recommended as a "new outstanding Diesel engine lubricant" by Caterpillar Tractor Co.**

through two 1730-foot tunnels driven through the Arizona Canyon wall. Bedrock was first reached at a depth of 230 feet, and the deepest part of the excavation is expected to reach 240 feet.

Parker Dam will be a concrete arch type structure 340 feet high, but with only about 100 feet rising above the level of the stream bed. The dam will create a reservoir with storage capacity of 700,000 acre-feet, and will raise the water surface over 75 feet for diversion into the Metropolitan Water District aqueduct.

Foundations for a power house are now being constructed. Eventually, four generating units of 20,000 kilowatt capacity each will be installed. Two of these will be used by the Metropolitan Water District, and two will be reserved for the government.

At present, Parker Dam is over 70 per cent complete.

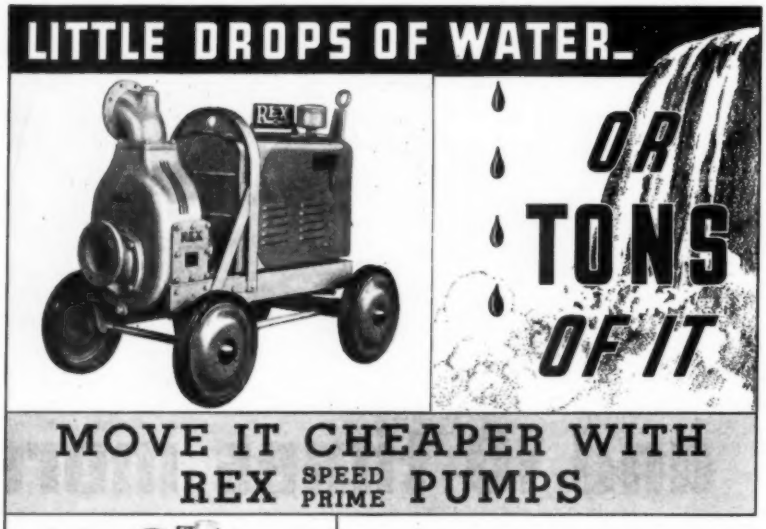
### *Pilot Knob Contract Awarded*

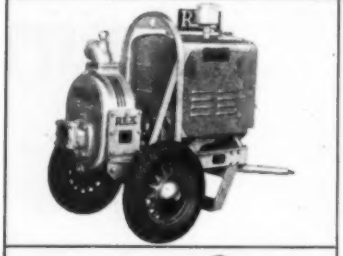
The contract covering construction of the Pilot Knob check and wasteway, the largest remaining structure on the All-American Canal, has been let to V. R. Dennis Construction Company of San Diego, California, on its bid of $314,519.

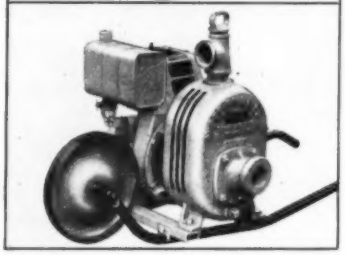
The structure at Pilot Knob will serve as a safety valve on America's biggest irrigation ditch. It will be located near a knob-like hill on the west bank of the Colorado River close to the International Boundary between the United States and Mexico, where the great canal turns westward to cross the Imperial Valley. The wasteway will regulate the flow of the canal before it begins its 60 mile reach across the desert, dumping excess water back into the Colorado River.

The successful bid for construction of the check and wasteway was the lowest of 11 proposals opened June 28 by the Bureau of Reclamation at its office at Yuma, Arizona.

The wasteway will be of reinforced concrete construction. Its construction will involve 517,700 cubic yards of excavation; placement of 1,830,500 pounds of reinforcement bars, placing concrete and installation of machinery to operate the check and wasteway gates.



It doesn't matter if you're pumping seepage or thousands of gallons an hour—Rex Speed Prime Pumps are designed to handle both at a lower cost—with greater dependability.

Their prime control is completely automatic and recirculation stops once the pump is primed—no wasted power while pumping. The patented Rex peeler enables them to pump in the face of air leaks in the hose or loose fittings that would stop any pump with less air-handling ability.

The big recirculating water chamber keeps the water cool while priming—aids in the faster prime.

The "Z" Metal Impeller resists both corrosive water and abrasive sands—it is of the trash type to handle dirty water without clogging.

Light, modern mountings enable you to spot them close to the hole. There are sizes to meet your water-moving needs—from the little 2" 7M to the husky 8" 125M.

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REX CHAIN BELT COMPANY of MILWAUKEE
*Speed Prime Pumps*


### *New P. C. A. Head*

Frank T. Sheets succeeds Edward J. Mehren as president of the Portland Cement Association on September 1.

For 23 years, Mr. Sheets was associated with the Illinois Highway Department, being superintendent of highways and chief engineer during 12 of those years. He was a pioneer in the use of concrete for highways, and is the author of a book, "Concrete Road Design, Simplified and Correlated with traffic."

During the past four years he has been consulting engineer and director of development of the Portland Cement Association.

### *Concrete Pouring at Grand Coulee*

The steel bridge, 3,000 feet long, and 175 feet high, recently completed across the Columbia River at Grand Coulee Dam is unique in that within six months it will have disappeared, having been imbedded in the concrete of the growing dam.

Three standard gauge railroad tracks cross the bridge, which extends from the two great concrete mixing plants located at the west and the east abutments. It is one of the busiest bridges in the world, since a relay of trains are moving back and forth across it continuously hauling concrete in 4-cubic yard buckets for placement in the dam. Already nearly 6,000,000 tons of concrete has been handled by cranes which move about on the bridge to serve the workmen far below.

The bridge contains 7,000 tons of steel and it cost more than half a million dollars. Despite the fact that burying such a structure in the concrete of the dam would appear to be a loss, it is the most efficient means devised, and less expensive than any other method proposed for placing the enormous yardage of concrete required over the foundation area 500 feet wide and 3,000 feet long.

From the high bridge cranes swing buckets loaded with eleven tons of con-



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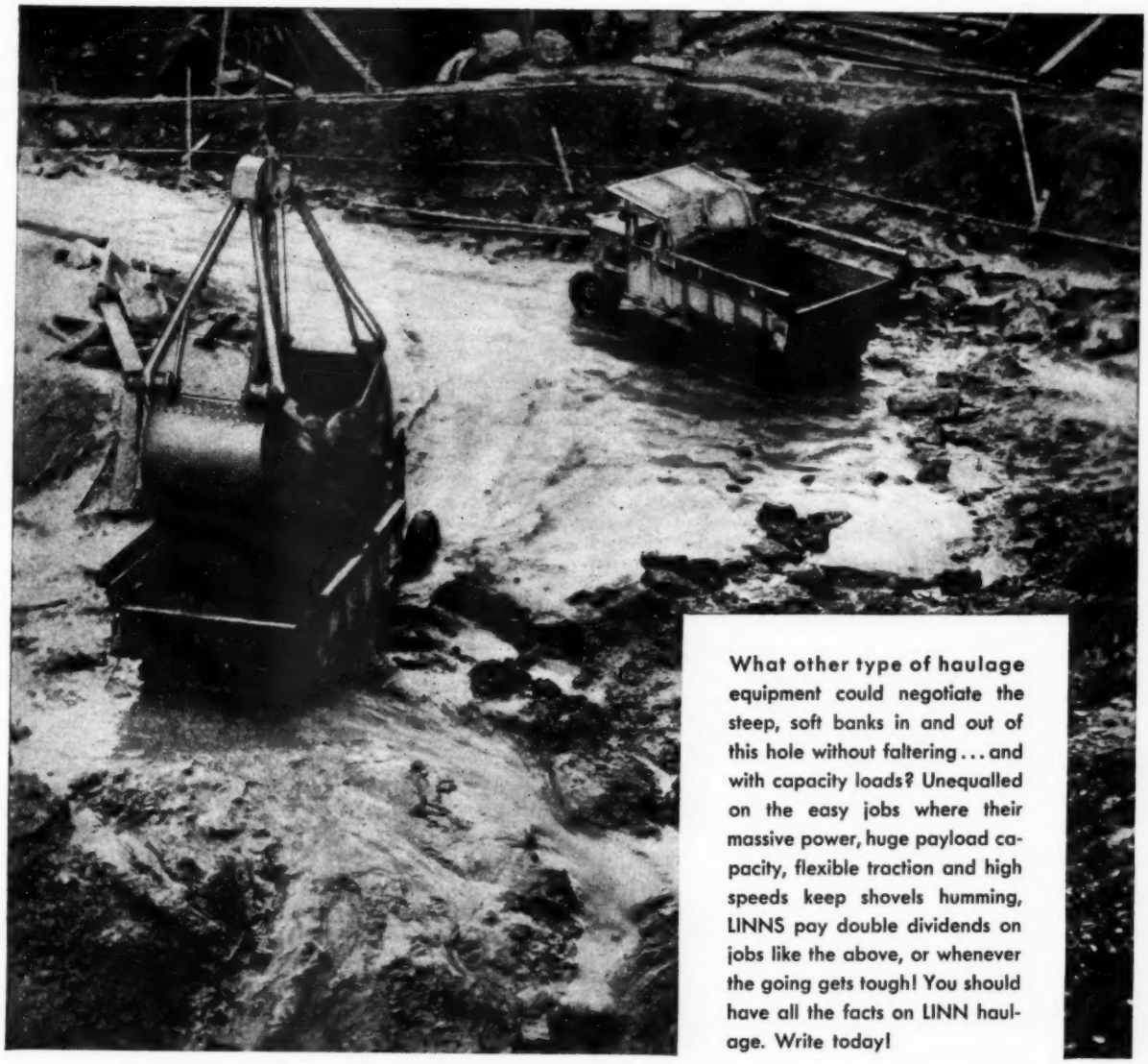
# *Of course they're* LINNS

## . . . AND DOING A FULL DAY'S WORK!



What other type of haulage equipment could negotiate the steep, soft banks in and out of this hole without faltering . . . and with capacity loads? Unequalled on the easy jobs where their massive power, huge payload capacity, flexible traction and high speeds keep shovels humming, LINNS pay double dividends on jobs like the above, or whenever the going gets tough! You should have all the facts on LINN haulage. Write today!

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Spokane, Wash.
Worcester, Mass.



For your convenience in writing to The Linn Manufacturing Corporation, you will find a card bound in this issue.

• George D. Auchter's Bucyrus-Erie dragline is building up a fill on a Florida road job, borrowing the dirt from an adjacent canal. The two "houses" contain Caterpillar Diesel plants used for pumping.

crete to any point within a strip 125 feet wide across the river. A second and lower bridge, which has not as yet been completed, will cover the remainder of the foundation area. The lower bridge also will be swallowed up as the dam grows.

## *State Highway Departments Surface 28,913 Miles in '36*

State highway departments placed 28,913 miles of new highway surfacing in 1936, according to reports of State highway departments to the Bureau of Public Roads of the United States Department of Agriculture. The new surfaces consisted of 4,706 miles of high-type surfaces such as bituminous macadam, bituminous concrete, portland cement concrete, and brick and 24,207 miles of lower types of surfacing.

Subdivided according to class of road, 23,885 miles of rural primary State roads were surfaced, 614 miles of urban extensions of State systems, and surfaces were placed on 4,414 miles of secondary road under State control in the 14 States having State administration of local roads.

For every mile of surfacing placed on an earth road 2 miles of new surfacing was placed on old surfaced roads. A large part of the resurfacing consisted of replacement of worn surfaces with higher types.

The designated rural primary State systems now include 340,160 miles. The year's work brought the surfaced portion to 289,103 miles or 85 per cent, comprised of 113,695 miles of high-type surfaces and 175,408 miles of low types. Those States having the largest mileage of high-type surfaced roads in the primary system are as follows:

| | |
|---|---|
| New York | 10,384 |
| Illinois | 10,126 |
| Ohio | 6,970 |
| Pennsylvania | 6,851 |
| Texas | 6,365 |

At the end of 1936 the existing surfaces on rural primary State roads were as follows:

| | Miles |
|---|---|
| Brick and other block types | 2,898 |
| Portland cement concrete | 81,283 |
| Bituminous concrete and sheet asphalt | 15,100 |
| Bituminous macadam | 14,232 |
| Low-cost bituminous mix | 33,805 |
| Waterbound macadam | 20,281 |
| Gravel and similar surfaces | 103,958 |
| Sand-clay, topsoil, etc. | 17,364 |
| Timber bridge floors | 182 |
| Total | 289,103 |

Bituminous treatments have been applied to 17,743 miles of waterbound macadam, 39,177 miles of gravel and 8,918 miles of sand-clay and topsoil.

## *State Highway Officials Meet in Boston*

Announcement has been made that the American Association of State Highway Officials will meet in Boston, Massachusetts, September 27 through 30, at the Statler Hotel.

Convention sessions will run from Monday through Thursday noon, and a number of caravan trips have been arranged for the following week-end.

## *Third Montana Bituminous Conference*

The Third Montana Bituminous Conference, combined this year with the National Road Oil & Asphalt Congress, will convene in Many Glaciers Hotel, Glacier National Park, Montana, September 7, 8 and 9. The combination of the two conferences devoted exclusively to discussion of methods of design, construction and maintenance of bituminous highways is expected to attract more than 500 of the nation's leading highway engineers, contractors and producers in the Bituminous field.

Don A. McKinnon, state highway en-

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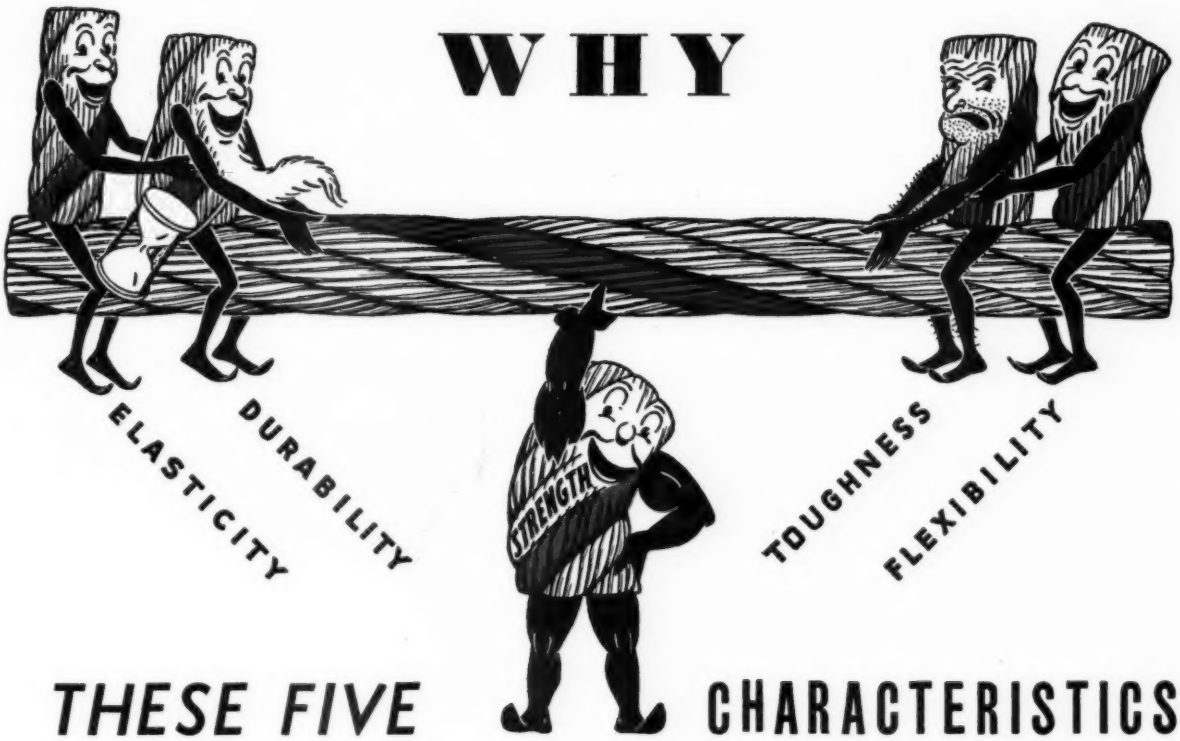


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gineer of Montana and general chairman of the conference, has announced a program in which every state as well as several provinces of Canada, Nova Scotia, some countries in Central America and South America have been asked to participate. Acceptances have been received from most of those invited and it is expected that the record of last year's conference, in which 28 states, 2 Canadian provinces and Argentina were represented, will be broken by a wide margin.

### *Dirt Moving Jobs Increase As New Coal Mines Open*

With the opening of more coal mines in Illinois several interesting auxiliary dirt moving and construction jobs come to light.

One in particular is the construction of a 2½ mile railroad spur from Dunfermline to the United Coal Corporation's tipple, with approximately 350,000 cubic yards of excavation involved. The average cut is 15 feet although it goes as deep as forty feet and fills in some places exceed a quarter of a mile. Width ranges from 80 feet at the top to 35 feet at the bottom.

Two Model "S-O" and two Model "L" Allis-Chalmers tractors pulling 7-yard Continental self-loading scrapers and an A-C Model "K" tractor with bulldozer, comprise the equipment being used on the job. The material handled varies

from good top soil and light yellow clay to a thick, sticky yellow clay and during recent rainy spells the tractors worked in mud that almost completely covered the crawlers. Operations are on a 21-hour a day schedule, seven days a week, and up to the present time over 175,000 cubic yards have been moved.

The United Electric Coal Corporation owns and operates one of the largest strip mines in the world at Duquoin, Illinois, and while the new mine will not be as large, it will be one of the most modern in operation.

Upon completion of the spur this fall, latest type mining equipment will be moved into the field which is estimated to include five square miles with thickness of overburden ranging from 6 to 60 feet. A 30-yard Bucyrus-Erie 950-B stripper and 5-yard Bucyrus-Erie 85-B loading shovel are included in the equipment for operation of the mine.

### *Heavy Advance Demand for 1938 Road Show Space*

The demand for "choice seats" for the five all-day performances of 1938's five-star production, to be staged by the American Road Builders' Association in Cleveland's Public Auditorium next January 17-21, far exceeds the demand for "tickets" of any other Road Show year.

"I have every reason to believe," said Charles M. Upham, engineer-director of the A R B A, "that our 1938 Road Show, with its thousands of lightweight and heavyweight informative exhibits, is going to be the first massive demonstration of its kind to completely fill the Cleveland Public Auditorium and its expansive exhibit halls in the fifteen-year history of the building."

Printed application blanks for exhibit space reservations were mailed out by the American Road Builders' Association the middle of July, but a full month before that time the executive offices of the organization in Washington, D. C., were receiving on the average of two request letters a day from exhibitors seeking advance Road Show floor space reservations.

### *Eight Dams for Orange County*

*By* **JOHN R. MARCY**

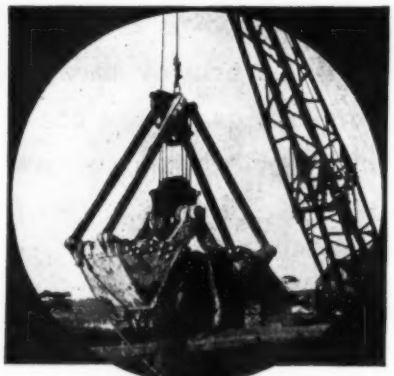
On July 27, Orange County, California, ratified a $2,500,000 bond issue which will be supplemented by a grant of $12,748,000 from the federal government for the purpose of constructing a series of eight dams and appurtenances of spillways and conduits, located in the mountains on the eastern border of the county.

These dams will not only control flood water, but will also conserve it for irrigation purposes. At present all the water for irrigating in Orange County is pumped from the ground, and consequently the water level has been steadily lowering. Water controlled by the eight dams will therefore be released to spreading grounds in order to replenish the underground supply, the method to be a combination of storage and delayed spreading.

The eight dams to be constructed are the Prado, Brea, Carbon Canyon, San Juan, Trabuco, Santiago, Fullerton, and Aliso. With the exception of the Santiago Dam they are all to be earth-fill with an impervious core and faced with hand placed rock upstream.

The Santiago Dam is already constructed and is faced upstream with concrete. This dam will be raised 30 feet higher. It is 1,450 feet long, 900 feet thick at the base, 15 feet at the top, and will have a storage capacity of 47,000 acre feet.

Prado Dam will be 2,350 feet long,

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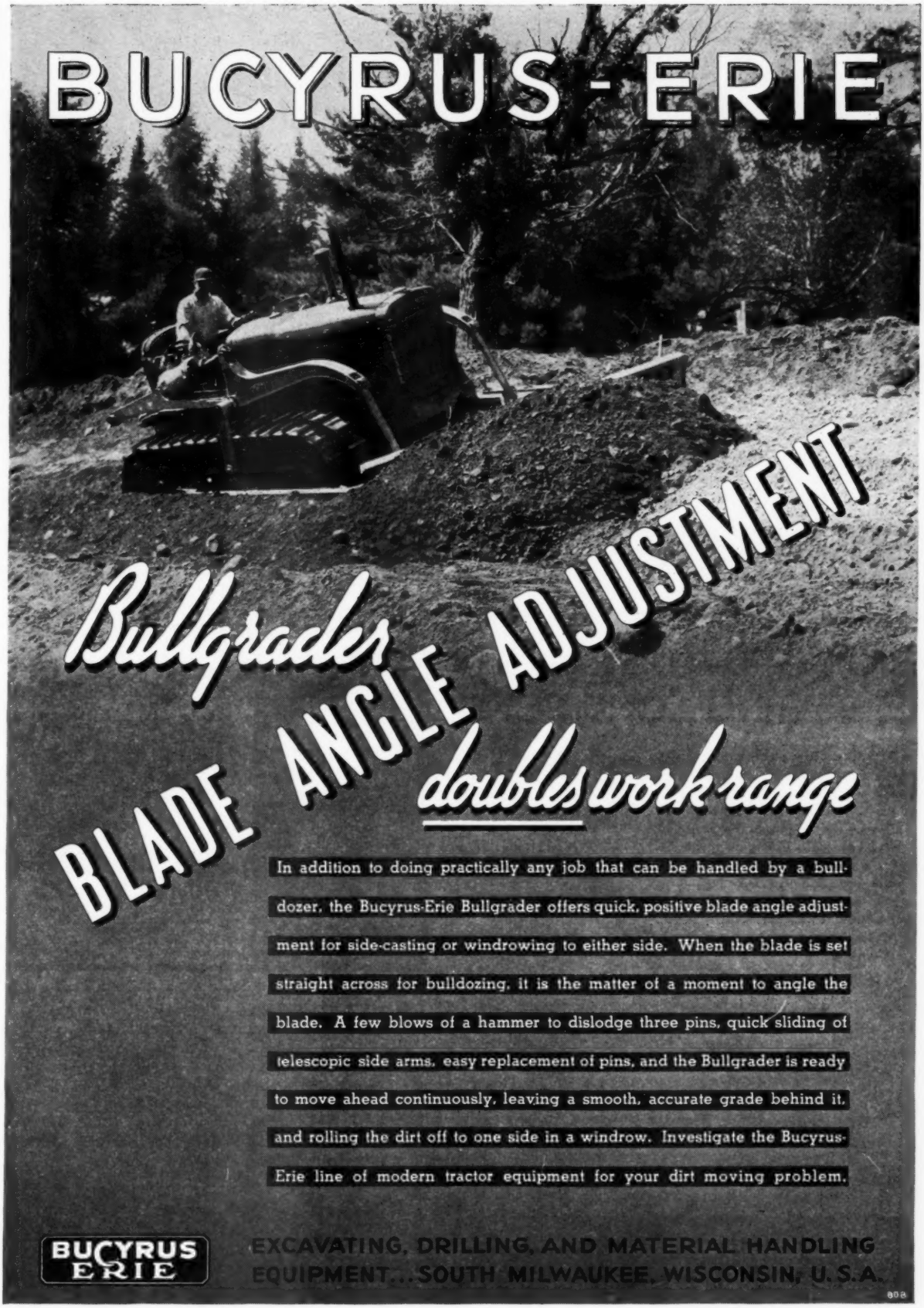
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doubles work range
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100 feet high, 950 feet thick, 15 feet at the top, with a storage capacity of 180,000 acre feet.

Brea Dam will be 1,250 feet long, 85 feet high, 550 thick, 15 feet at the top, with a storage capacity of 3,300 acre feet.

Carbon Canyon Dam will be 770 feet long, 120 feet high, 750 feet thick, 15 feet at the top, with a storage capacity of 2,500 acre feet.

San Juan Dam will be 2,500 feet long, 116 feet high, 730 feet thick, 15 feet at the top, with a storage capacity of 25,500 acre feet.

Trabuco Dam will be 1,200 feet long, 100 feet high, 650 feet thick, 15 feet at the top, with a storage capacity of 3,900 acre feet.

Fullerton Dam will be 500 feet long, 45 feet high, 300 feet thick, 15 feet at the top, with a storage capacity of 1,660 acre feet.

Aliso Dam will be 720 feet long, 80 feet high, 500 feet thick, 15 feet at the top, with a storage capacity of 500 acre feet.

Besides the construction of the dams, the project will involve the relocation of several miles of state highway and various public utility lines.

The work will be under the supervision of government engineers, and will be contracted. It is not yet known how soon bids will be called for, but it will doubtless be some months, as land rights will first have to be purchased.

• A "flock" of sheepsfoot rollers compact the earth fill at Cajalco Reservoir, part of the Griffith Company operations on the Colorado Aqueduct.

### *Power at Boulder Dam*

Manufacture of two more of the giant generators used at Boulder Dam is covered in a contract awarded to the Westinghouse Electric and Manufacturing Company on its bid of $1,467,000.

The successful bid was the lowest of three submitted to the Bureau of Reclamation at its Denver office, June 14. The two generators, each of 82,500 kilovolt-ampere capacity, will complete units A-6 and A-7 in the Arizona wing of the Boulder Dam power house, for which contracts totaling $1,984,634.50, covering turbines, governors, transformers and switches, were awarded recently.

This contract calls for the manufac-


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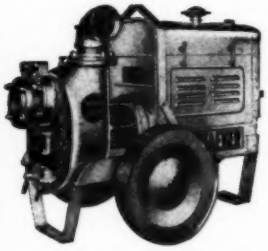

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Used—Booster pump.

*Turn to page 550 for rate information*





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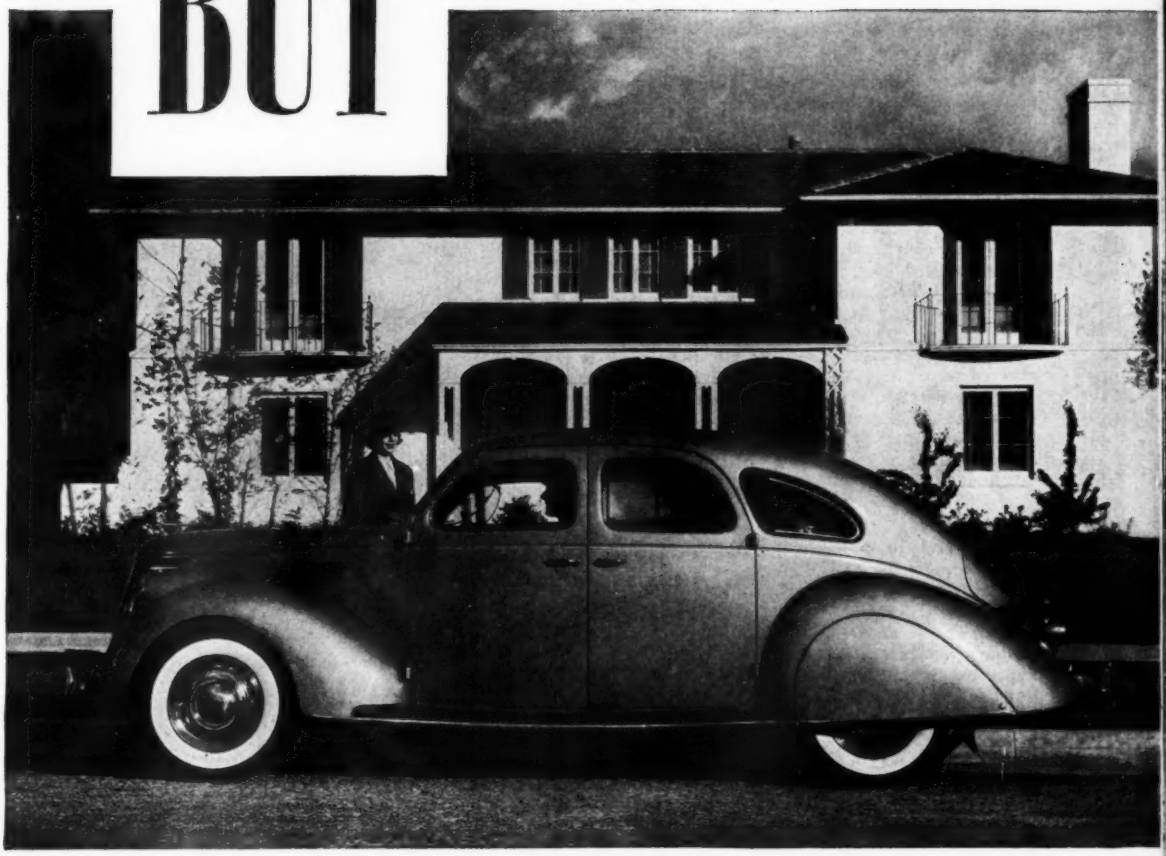

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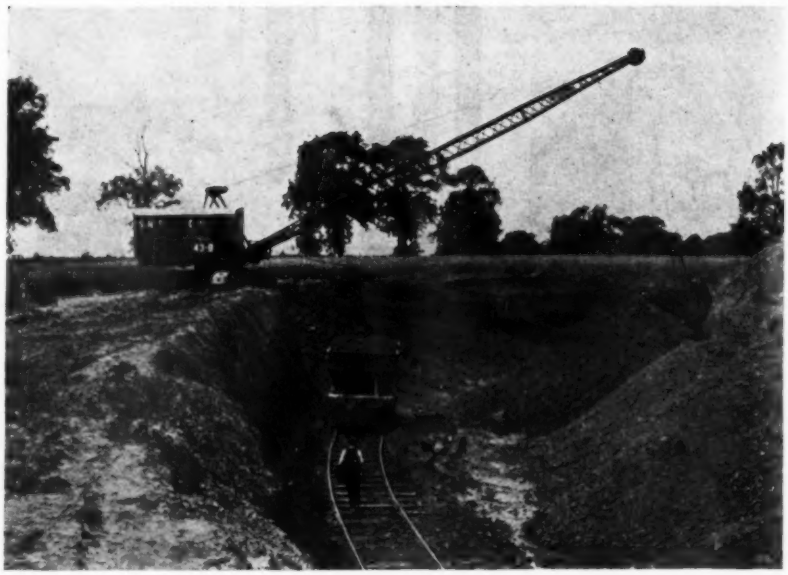

• **Stanton Ironworks Co. Ltd., is using this 43-B dragline in England, uncovering an ironstone deposit. Overburden is about 4 feet, the ore deposit is 12 feet thick, and is uncovered to a 60-foot width.**

ture and installation of the first of the new generators in 700 calendar days and the second within 800 calendar days.

Four similar generators have been installed and are in operation in the Nevada Wing of the power house, serving the City of Los Angeles and other Southern California municipalities. Revenues from these generators totaled in June, 1937, the first month during which they operated on a firm power basis, $125,000. They are expected to yield over $1,500,000 in a year.

Two additional generators of the same size to serve the Metropolitan Water District of Southern California are being manufactured and will be installed in units N-5 and N-6 on the Nevada side.

### *Toe Gravel at Fort Peck*

In addition to large quantities of hydraulic earth fill pumped into the Fort Peck Dam by their four electric dredges, the Army Engineers are using large quantities of coarse gravel for the upstream and downstream edges (toes) of the dam and as a blanket base for rip-rap rock on the slope facing the reservoir. This season has seen a total of 418,204 cubic yards of gravel put in place or an average of 124 carloads per day since unloading started May 5th. Since the start of the job, 3,284,726 cu. yds. of coarse gravel have been placed.

In addition to toe gravel, there have been 56,000 cubic yards of glacial boulders placed on top of the gravel to serve as rip-rap against wave action. This made 1,642 carloads or an average of 55 per day. Total boulders placed to date add up to 458,171 cu. yds.

Eight carloads of stone from the new Snake Butte quarry served as an experiment for the unloading crews. The cars carried stones from one to seven tons each. No difficulty was experienced in handling even the largest pieces so the quarry started shipping about 35 carloads per day August 4th. About 50,000 cu. yds. of glacial boulders will be shipped from Cole, Montana and will complete shipments of rock of this type.


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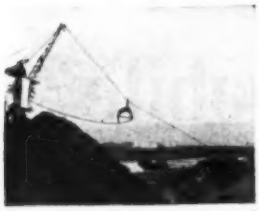

*Sauerman Scraper, operated by crane, hauls dirt 250 ft. onto embankment.*

*Mining gravel from a deep, wide deposit and hauling to crushers at rate of 120 cu. yds. per hour.*

You can make larger profits on many dirt-moving jobs by using Sauerman Scrapers.

Any two-drum hoist or boom machine can be used as a power unit.

Handling capacities will range from 10 to 600 cu. yds. per hour, depending upon the size of Sauerman Scraper you use. Operating spans may extend as far as 1,000 ft. or farther.

*Write for Catalog*

**SAUERMAN BROS.**
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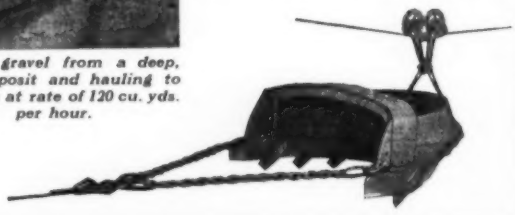

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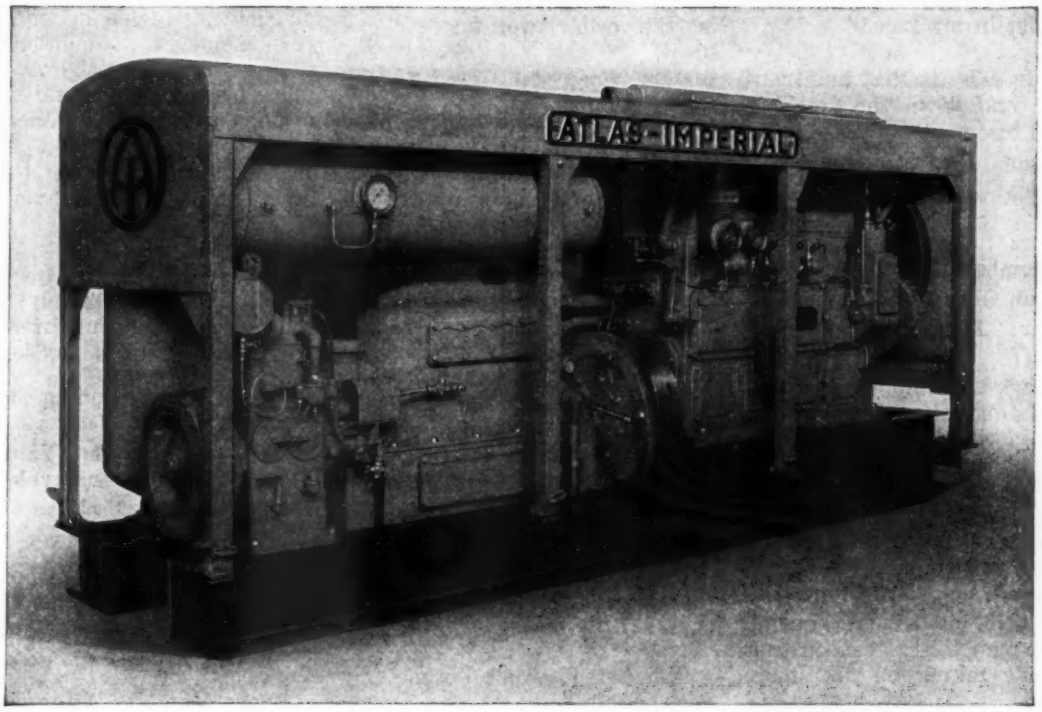


The same economy of operation and dependability that has been so characteristic of Atlas Diesels used in excavating equipment is also found to the same degree in the Atlas Diesel powered Portable Air Compressor shown above.

This unit consists of a 6" x 8", 60 H.P. Enclosed Type Atlas Diesel complete with radiator cooling system. It developes its rated horsepower at 700 R. P. M. It is direct connected to a 7½" x 6" Worthington Triplex Vertical Compressor. It is rated to operate at 100 pounds per square inch and when turning at 700 R.P.M. it has a displacement of 320 cubic feet per minute.

Here we combine the same Atlas Diesel that has broken records in power shovels and draglines in all parts of the world, with the efficient and dependable Worthington Compressor, famous for its Feather Valves. This unit will furnish compressed air at approximately ⅓ the cost of operating a gasoline powered compressor of the same capacity.

The engine uses just half the number of gallons of fuel as a gasoline motor of equal power, and the fuel oil averages about ⅓ the cost of gasoline. You save 83% on fuel costs alone, and in addition you cut your fuel hauling cost in half, because you need only half as many gallons of fuel. It's an ideal unit for any construction job, quarry or mine whose compressed air requirements are within the limits of the compressor.

## ATLAS IMPERIAL DIESEL ENGINE CO.

Oakland, California — Mattoon, Illinois

# ATLAS IMPERIAL



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# Not in the Contract

None of us is perfect, and some of us are absolutely impossible.

Doctor: "May I kiss you?"

Nurse: "Certainly not. Do you think I want to have a doctor's bill thrust in my face?"

"Daddy, why is that man running up and down the smoking car with his mouth open?"

"My son, he's a Scotchman getting a free smoke."

Chaser: "Give me your telephone number, Gretchen dear."

German Girl: "9999."

Chaser: "All right. Then don't."

To start with, Jones does not cut a distinguished figure in his evening clothes. In a fashionable restaurant the other night, as he stood near the door waiting for his wife, a tall, pompous man came up and asked, "I say, my man, are you the head waiter?"

As quick as a flash Jones answered, "No, but I heard him tell a young man this afternoon that he wasn't taking on any more help."

Contractor: "What type of boy is Elmer?"

Superintendent: "Well, the other night he had a parlor date. The lights went out at 9:30 and he spent the rest of the evening in the cellar working on the fuses."

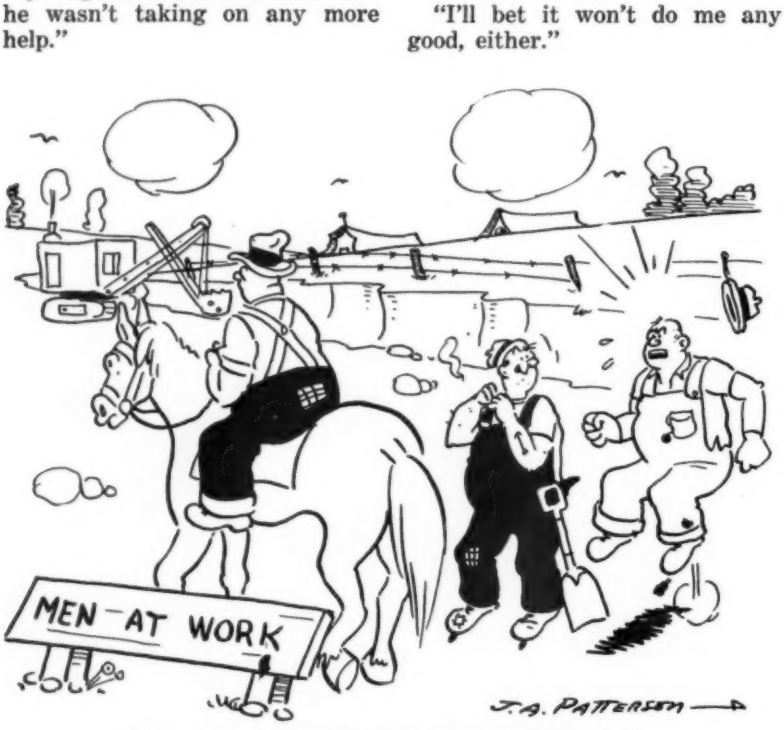
Then there is the stenographer who quit her job because the boss insisted upon a recreation period at the end of every sentence.

A bride was flying around on her wedding morn preparing for the great event. Her brother looking very serious said, "Sis, are you sure you are marrying the right man?" The bride, a gentle girl, and refined, replied, excitedly, "Well, this is a hell of a time to ask me."

"Say, pop, did you go to Sunday school when you were a little boy?"

"Yes, son, regularly."

"I'll bet it won't do me any good, either."




*"Say, now I remember what Oscar called you."*

The street car was crowded. The stout lady who had just got on vainly endeavored to locate her purse which was tightly buttoned up beneath her cloak as a precaution against pick-pockets. After she had struggled in vain for a few moments, a gentleman in front of her said: "Madam, please allow me to pay your fare."

The stout lady declined with graceless thanks and recommenced her search for the concealed purse. Again the gentleman addressed her:

"Madam, please, please, for heaven's sake let me pay your fare! You have already unbuttoned my suspenders three times and I can't stand it any longer!"

He: "I'm beginning to get stuck on you."

She: "No wonder. Your eyes have been glued on my legs for the past hour."

"Lighthouse no good for flog," says Chinaman. "Lighthouse he shine, whistle he blow, flog bell he ling, and flog he come just the same. No glood."

Shovel Runner—After one more kiss, I'm going to talk turkey.

Girl Friend—Yeah, but when you get into the restaurant you'll order ham sandwiches.

My roommate says there are some things a girl shouldn't do before twenty."

"Yeah, I don't like an audience, either."

The preacher had just finished a sermon on the duties of wives to mother their husbands.

"I want every woman who will go home and mother her husband to stand up," he cried.

A little woman, who was known to be a trifle deaf, leaped to her feet.

"Ah," cried the preacher, "there is one woman who will mother her husband."

"Mother him?" cried the woman, sitting down again, "I thought you said 'smother him'."

*(Continued on page 546)*

# The EXTRA ECONOMY of TRACK HAULAGE

Haulage by Whitcomb Locomotive on rails eliminates the constant upkeep expense of dirt roads. New methods make the work of shifting and moving tracks easier than ever before. There is less rolling resistance in track haulage—fewer stresses and strains on the equipment, hence it provides more years of serviceable life.

Whitcomb Locomotives give you compact, flexible power. One man hauls many loads at a time. Whitcomb equipment gives you the benefit of 31 years experience in building industrial locomotives, plus the vast resources and engineering experience of The Baldwin Locomotive Works.

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**The Whitcomb Locomotive Company**
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# G-E CABLE OPERATES AT 4 TIMES RATED VOLTAGE

ORDINARILY, you wouldn't think of asking a 600-volt cable to operate on a 2300-volt circuit. And we're not suggesting that you do.

But the following letter tells an interesting story of such a substitution, and it does indicate that this G-E tellurium-rubber cable is a high-grade product.

*A letter received by a G-E District Cable Specialist*

You will be interested in a recent emergency case in which we had a 2300-volt cable failure on two 125-horsepower fire-pump motors. It is very important to keep these fire-pump motors running seven or eight hours each day, and we suddenly found ourselves without any suitable size of 2300-volt parkway cable or rubber-covered wire.

It so happened, however, that we had on hand 300 feet of Type W, 600-volt, No. 6 stranded, tellurium-compounded all-rubber-covered cable. We immediately connected this as our emergency circuit, and it served the pumps for twenty-four hours while we were searching for something with which to replace it. Since the cable stood it in satisfactory manner, we continued to operate this way for a little over two weeks while new 2300-volt cable was purchased and shipped to us.

This is quite a satisfactory performance, inasmuch as the circuit operated at four times its normal operating voltage over a period of two weeks. I find this cable quite indispensable as an extra supply item for miscellaneous purposes where a flexible cable is wanted, especially for temporary uses. Hence, I thought you would be interested in this case.

Yours very truly,

*(Name on request)*

## IT'S TELLURIUM

Three-conductor, Type W, Portable Cable

**For Many Uses**—For electric shovels and dredges, for mining machinery, for arc welders, for all sorts of portable equipment, there is a type and size of G-E tellurium-rubber cable that is just suited. For prices and detailed information, see Bulletins GEA-1728 and GEA-1918, which we shall be glad to send you on request to the nearest G-E sales office or General Electric, Dept. 6E-201, Schenectady, N. Y.

**GENERAL ELECTRIC**



For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

# Calyx Drilling

(*Continued from page 522*)

be controlled within the shaft this method is far superior to any method of formation inspection yet devised. In the case of diamond cut cores much of the softer material is flushed away, the nature and placing of which it might be desirable for the engineer to know. Where it is possible to actually see a clean cross section of the rock strata every fact relative to seams, joints, and fissures may positively be ascertained.

Also in the case of the small diameter core there is the possibility that the material is not representative of that in the near vicinity. This possibility would seem to increase in proportion as the diameter of the core decreased. With holes a yard across this possibility all but disappears. Engineers no longer design or build heavy structures without accurate data relative to sub-surface conditions, and calyx drills have made a notable contribution toward more exact knowledge of structural foundations.

The cost of drilling by the calyx process naturally varies greatly according to local conditions. In many cases the cost of moving and setting up the rig was greater than the actual cost of drilling. Tables (I), (II), and (III) will give a fairly wide average for conditions encountered in the three principal reclamation projects. When these projects have been completed and further experience gained the costs will probably be reduced. A completely equipped calyx drilling outfit delivered in the West would cost around $8,000 or $10,000.

**Acknowledgment is hereby made to Mr. Nelson B. Hunt, Office Engineer, Bureau of Reclamation at Sacramento, for much data and assistance in the preparation of this article.**

## Table III

**In Table III is shown the drilling costs of three holes at Kennett Dam.**

| | | |
|---|---|---|
| Total working time to date [1] [2] | | 4,694 |
| Total drilling time to date [2] | | 1,834 |
| Percentage of working time used in drillling | per cent | 39.1 |
| Total delays—equipment failures and service [2] | | 294 |
| Total time for removing core [2] | | 2,566 |
| Total time for moving drill [2] | | 1,256 |
| Total shot used | pounds | 4,650 |
| Total depth drilled | feet | 187.5 |
| Shot used per foot of drilling | pounds | 24.8 |
| Drilling per man-hour of working time | feet | 0.04 |
| Drilling per man-hour of drilling time | feet | 0.10 |
| Total cost of drilling | | $4,994.06 |
| Cost of drilling per foot | | 26.63 |
| Net cost of drilling [1] | | 4,224.80 |
| Net cost of drilling per foot [1] | | 22.53 |

[1] Does not include time or cost of moving drill rig.
[2] Man-hours.

# Covering Lake County

(*Continued from page 516*)

gravel loading at his own pit, and a 2,000-yard job on a federal housing project north of Libertyville lined up for his 10-B. However, while we were at Allendale, a building contractor drove up and wanted a basement dug in a hurry. Whether Mr. Kennedy will do the job or not, we don't know. But we do know that if you want to see his machine, you must be prepared to go anywhere in Lake County. Better go quick, too, because it may be digging a basement in one town this morning and working at the other end of the county this afternoon.

## Table II

**Table II is a tabulation of drilling costs in 8 holes, Friant Dam site.**

| | |
|---|---|
| Moving and setting up drill | $1,066.86 |
| Drilling | 2,145.99 |
| Removing core | 2,282.81 |
| Repairs to equipment | 528.87 |
| Alterations of equipment | 201.90 |
| Truck charge and general expense | 1,002.45 |
| Total cost of drilling | $7,228.88 |
| Cost of drilling per foot of hole | $18.42 |
| Total pounds of shot used | 3.202 |
| Pounds of shot per linear foot of drilling | 8.1 |

## *Not in the Contract*

(*Continued from page 544*)

Fuel Dealer: "Quick, my coal yard is on fire."

Fire Chief: "Oh, is it? Well, if it's the same stuff you sold me all last winter there's no hurry!"

"I get a hundred words a minute out of my stenographer," said the first contractor. To which, the second grinned, "That's nothing. I get two hundred out of my wife."

A tourist just returned from the West reports that the absolute in service was encountered by her at one filling station where the obliging attendant, after wiping off the windshield, checking the oil, tires, and filling the radiator, politely asked if the baby needed changing.

• *"I put it in as a sideline."*